In This Issue: Electricity in Office Buildings and Department Stores

JOURNAL OF ELECTRICITY

VOL. 42 NO. 4 SAN FRANCISCO, FEBRUARY 15, 1919 PER COPY, 25 CENTS

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Big Convention Issue

The April 15th issue of the JOURNAL OF ELECTRICITY will be a special "Convention Issue" of exceptional advertising value.

The joint annual convention of the Pacific Coast Section of the National Electric Light Association, the Pacific Division of the National Electrical Supply Jobbers' Association, and the California Association of Electrical Contractors and Dealers, which is the largest gathering of the year of electrical interests west of the Rockies, will be held at Hotel Del Coronado, California, April 30th to May 2nd, inclusive, and the attendance will probably exceed 700.

Arrangements have been made with the JOURNAL OF ELECTRICITY to publish in its April 15th issue the full programme and papers to be read at this Convention. This issue of the JOURNAL OF ELECTRICITY will constitute the official distribution of the papers, and the Pacific Coast Section of the N. E. L. A. has ordered several hundred extra copies for special distribution to insure that its members and others who expect to attend the Convention may have ample opportunity to read and study the papers and be prepared to discuss them at the Convention.

The papers to be presented cover a number of subjects of particular interest to the electrical industry at this time, and this issue of the JOURNAL will therefore attract unusual attention not only from those interested in the Convention, but from its regular subscribers throughout the United States and Foreign Countries as well.

There is already a heavy demand for advertising space in this issue, and, in order to insure satisfactory service, it is imperative that copy and cuts be in our hands not later than March 15th, preferably before.

If you wish to reach the large buyers in the West among the Hydro-Electric, Steam Power or Industrial Plants, the Wholesale Distributors or the Contractors and Supply Dealers, this is an opportune time to do so.

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor — CLOTILDE GRUNSKY, Associate

VOLUME 42 — SAN FRANCISCO, FEBRUARY 15, 1919 — NUMBER 4

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NEW ELECTRICAL RECORDS IN THE WEST—

Not only in electrical uses upon the farm and in the long distance transmission of electrical energy does the West excel, but the evolution of the method electrical in the department store and the large office building in the great populous centers of this vast district is each day bringing to light new records in achievement. Typical of this splendid march of progress is the great office building of the Southern Pacific Company at the foot of Market Street in San Francisco. Here the high Sierra has furnished twenty miles of piles upon which to rear a structure in a section formerly claimed by the waters of San Francisco Bay. And in this structure, which is said to be one of the world's largest office buildings, the use of electricity in handling the enormous daily traffic of people passing in and out, in the transmission of intelligence from office to office and in the lighting design for the convenience of its occupants, unquestionably has established records hitherto unattained in the evolution of the art.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 42 SAN FRANCISCO, FEBRUARY 15, 1919 Number 4

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Nations are but the embodiment of the collective thought of their citizenry. Are you thinking constructive ideas on how world affairs may progress by mutual cooperative helpfulness on the part of all nations of the world? Such thoughts alone can aid in establishing world peace and international prosperity, and without them a League of Nations to enforce peace is of no avail.

The Strategic Position of the Jobber

The electrical supply jobber occupies a position of readiness to serve in the present stress of affairs that is unique in the industry. Never in history has the opportunity been so good as at present for the jobber to be of value to the contractor, central station, independent telephone operator and retail merchant. The best authorities agree that commodity prices will undoubtedly seek lower levels during 1919, and merchandise stocks should be held to the lowest possible minimum. The laying in of large stocks, at prices that may seem low for the time being, should be avoided. The best advice to follow is to buy for current needs only, and depend on your jobber to keep your stock in shape. Numerous small shipments may be more expensive to handle, but will be vastly less expensive than the maintenance of a large stock which is steadily depreciating in value. In these days of uncertain railroad service, where the value of freight is liable to decline heavily while in transit, avoid heavy factory purchases, and let your jobber carry the stock for you, thereby "spreading out thin" over the entire industry such losses as may occur.

In this ability and preparedness to serve the industry during the present crisis, the electrical supply jobber occupies a strategic position that justifies beyond the question of a doubt the strong confidence felt for him by the industry as a whole.

The Baseboard Receptacle Problem

The necessity of installing proper baseboard receptacles is a problem that each day grows in importance due to the gigantic increase in the use of electric appliances. Some indication of its magnitude may be gleaned from the fact that last year's sales in electric apparatus in America totaled in value over ten million dollars.

It is a problem, however, that must be handled with considerable tact and diplomacy. Unquestionably the extra cost of installing baseboard receptacles, especially in houses already built will, if not properly handled, affect the sale of appliances. At the same time undue fear should not be allowed to control the mind of the public in regard to the fire hazard, for false conclusions are liable to be drawn.

Faced squarely, the problem as a whole is briefly about this. With the appearance of the electric iron and some of the lighter electric loads, customers found easy access to the electric fixture to be a matter of such convenience as to greatly accelerate the introduction of electric appliances. The single socket was soon replaced by a two way socket, then the three way socket appeared in order to allow ever increasing use of appliances. Soon the capacity of the fixture wires was in some instances exceeded, fuses blown and troubles ensued. Then came the vacuum cleaner with its pulling and twisting effect upon the fixture and the consequent injury to the fixture.

Meanwhile the central station did not pass by without complaints in service—complaints of poor lighting due to over-loading of wires and often interruptions of service caused by the blowing of fuses, and even in some instances the burning out of meters.

There is no question but that the use of electric appliances—mammoth as may seem their output in sales to date—is but in its infancy. It would seem then that the only worthwhile solution is to face the issue squarely.

Data should be gotten as to carrying capacities of fixture installations and the consumer should be advised tactfully and frankly as to a reasonable and sane use of the fixture, and in addition he should most emphatically be educated in the use of the baseboard receptacle and its excellent economic features. Among such features may be classified a greater ease and facility in service, a saving in heating loss from meter to receptacle, a possible better rate in house

insurance, and the fact that a baseboard receptacle power rate of practically one-half is usually allowed by power companies under separate meter measurement.

While the installation of an individual baseboard receptacle for each room may at first glance seem difficult to bring about, its accomplishment can be attained little by little in an enlightened campaign of education. Especially can great strides forward in this regard be brought about by a fair and open campaign and discussion of its merits with the leaders among the architects.

In fact, the joint cooperative helpfulness with the architect on the one hand and the manufacturer, jobber, central station and contractor-dealer on the other is needed, for in a delicate problem, such as this, fairness and evident desire to do the square thing will after all accomplish the only worthwhile results—namely, the greater use of the electric appliance that brings about the easing of human burdens and at the same time the forwarding of safety to property and the individual combined with an economic saving.

Electricity for Harbor

Considerable attention is being given in these days of readjustment to increasing the port facilities of the Pacific Coast cities to meet the growing demands of Pan-Pacific commercial interchange. Local development leagues are taking active steps in several of the larger sea ports to investigate the present conditions and see how electrical energy can the better effect increased facilities in loading and unloading ships and in clearing the approaches from material of commerce as fast as it accumulates, thus greatly enlarging the capacity of dockage and general port equipment.

In one particular seaport the electrical development league of that section has even gone one step further—namely, to bring out discussion looking toward actual results in this matter of such great present-day import. Electricity can undoubtedly play a far more effective part in cargo handling appliances, portable machine conveyors, and in the installation of an extensive electrified system of belt roads interconnecting with the various wharves, than it does at present.

Such investigation is a matter of prime importance and undoubtedly the resulting installations in electrical equipment will in the not far distant future vastly extend the uses of electrical energy and at the same time add an increased prestige for the port where such installation is made.

Westinghouse Jobber-Agents' Meeting

More and more it is coming to be recognized that personal contact of men engaged in the electrical industry with the various national selling organizations is a matter of great importance to the future of the industry. Men engaged in this selling activity, due to the constant urge under which they labor to acquire the latest and most improved ideas necessary to sell their product, are in position to absorb and assimilate the promise of business opportunity quite often more readily than those directly upon the ground.

The readjustment period in which the West now finds itself involved is a period of perhaps more hope and promise to the electrical industry than ever before in its history. The great need is to have the nation as a whole know more of its worth, its present splendid accomplishments and the gigantic commercial and engineering future that is immediately before the West due to its vast natural agricultural and water power resources combined with the strategic position Pacific Coast ports occupy in the vast Pan-Pacific development now under way.

In view of these facts, the forthcoming National Jobber-Agents' meeting of the Westinghouse Electric and Manufacturing Company with its hundred representatives from every quarter of the nation at Del Monte, California, May 4-11, 1919, is a meeting of unusual significance to the electrical industry in the West. And it is hoped that their presence among us will prove as profitable and helpful to them as we know the good effects their inspiration and enthusiasm for the industry as a whole will be to us.

A Technical Course of Special Interest

Learn to increase your efficiency by studying the elementary laws of electricity, is the slogan that is more and more felt throughout the electrical industry in the West. Power station operators, electrical contractors, substation operators, linemen, telephone operators, electrical salesmen, public utility employes, may well heed the urge of this hour of world readjustment—perfection in a technical specialty.

Announcement is being made through the Extension Division of the University of California of an unusually helpful course in technical instruction, one that should receive the hearty endorsement of every well-wisher for success of men engaged in the electrical industry throughout the West. It is a course covering the elementary laws of electricity, series and multiple, circuits, voltage, drop, power and watt loss, efficiency, wire calculations, motors, generators, illumination and a host of other helpful discussions that may be undertaken through correspondence by the payment of a small fee. This course has the unusual feature of combining technical discussions from a great number of practical men of the electrical industry — central station men, telephone men, contractor-dealers, jobbers, electrical engineers and manufacturers—compiled in conjunction with the Journal of Electricity. Further information may be gotten by addressing the Director, University Extension Division, Berkeley, Cal.

The first article of this series will appear in the columns of the Journal of Electricity March 15, 1919. These articles will in themselves serve as the text for the course. Supplementary explanations, sets of problems, questions and answers will be furnished by the Extension Division to such students as regularly enroll in the course.

It is questionable if ever before an opportunity has been offered for advancement in technical instruction through correspondence that so happily harmonizes with the demands of technical study and practical illustration and application.

The Journal of Electricity is glad to be of assistance in forwarding this enduring work and to give to it the helpful advice dictated by an experience of thirty-two years in reflecting the electrical growth of the West.

National Engineering Society Officers

The usual Spring politics is now going the rounds over nomination for officers for the various national engineering societies. It is a pretty poor time to allow anything else than service to the particular society to influence choice in these matters. It is time that geographical districts must come in for consideration in order to have proper expression and completeness in the executive control. The main question at issue, however, is to secure men for the positions that will give active time and attention to the work and keep some life and enthusiasm in Western centers in their relationship with the parent societies.

Joint Engineering Society Effort

The interest in joint engineering society effort in the West continues apace. At Seattle, where much of the excellent results in effort of this sort received its pioneer initiation due to the untiring work of Mr. Lindsay of the Puget Sound Traction, Light and Power Company, effective results seem unusually near accomplishment.

Due to the stress of war conditions much of this splendid work had to be allowed to lag. A renewed interest is now apparent, and a large attendance and interest is assumed for future meetings.

The instance at Seattle is typical of renewed activity in engineering matters throughout all the Pacific Coast centers. Separated by thousands of miles from the parent societies, engineers in the West have found that development of the local section idea is the only salvation for mutual interchange of ideas.

It is believed that the West is aiding in developing this local section idea and the idea of joint society effort to a harmonious and efficient degree not attainable elsewhere in the nation.

Cost of Power Development in Europe and Canada

It is a well known fact that in spite of the great importance of water powers, many of the potential powers in existence must of necessity prove economically useless, either on account of their great distance from centers of industry, the lack of transportation facilities, or from the fact that the storage necessary to give a continuous or fairly continuous supply would be too costly.

It is interesting to note in this connection a rather complete summary of European and Canadian costs for electrical installations that have recently appeared in the Electrical Review of London.

An examination of some 120 European installations shows that for large installations of upwards of 10,000 e.h.p., the minimum cost of the hydraulic works is $40.80 per h.p. installed, and the maximum, $387.50 per h.p. For the majority of the installations the cost lies between $121 and $218. The cost of the electrical generators, switchboards, etc., and transmission lines, also varies greatly, ranging from $6.00 to $138.00 per h.p., while the cost of the turbines ranges from $19.45 to $38.90 per h.p. The working costs vary between $6.30 and $33.00 per e.h.p. year, with an average value of $14.60. From these figures it appears that on the average, making an allowance of 15 per cent for interest and depreciation, the cost per e.h.p. per annum is in the neighborhood of $51.00.

In many installations, however, the cost is very much less than this. The Ontario Power Company, for example, is able to supply power to the Hydro-Electric Commission of Ontario at $8.75 per e.h.p. per annum. It is estimated that many of the large powers in Canada can be developed at a total cost, including all generating machinery and transmission lines, ranging from $58.30 to $97.20 per e.h.p., in which case the cost per h.p. per annum should not exceed $9.70 to $14.60.

In view of the vast systems of storage that are required for the major power developments of the West, coupled with the necessity for building long and costly transmission lines, many of these great projects do not measure up to the low cost of installation as set forth in the above statistics for European and Canadian practice.

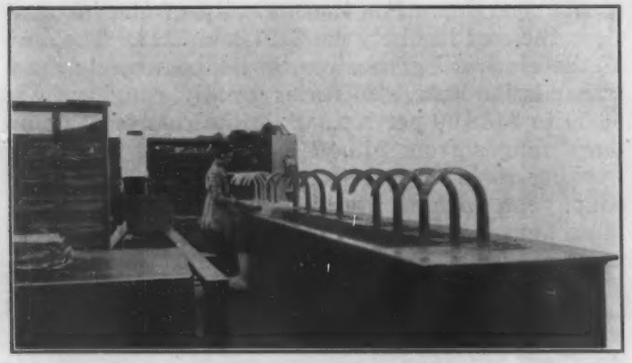
However, the extended agricultural and industrial uses to which hydroelectric power in the West is as a consequence applied in a district where fuel costs are unusually high has been the means of developing this type of energy to a degree unequaled anywhere else in the world.

NEW JOURNAL SERVICE: The Coronado conventions, consisting of the Pacific Coast Section, N. E. L. A., the California Association of Electrical Contractors and Dealers, and the Pacific Division, National Electrical Supply Jobbers' Association, are fast molding into concrete form. Men of the industry in all parts of the West are busy planning papers and collecting data for this important gathering of the year which will take place during the week April 28-May 3, 1919. The Journal of Electricity will feature this great convention in its issue of April 15, 1919, and in it will appear the official papers that are to be the basis of discussion at the gathering. It is expected that this issue of the Journal of Electricity will set new ideals of editorial attainment in helpfulness to the West.

ELECTRICITY IN A LARGE OFFICE BUILDING

(There is no more promising field for the applications of electricity in both large and small units than a great office building—as is clearly indicated by this general description of the Southern Pacific building of San Francisco. That its equipment is far more complete than that common in such buildings is proof of the field still open to the electrical man along these lines.—The Editor.)

The Southern Pacific Building, now the headquarters of the U. S. Railroad Administration, which is located near the ferry on Market street, San Francisco, is the largest office building west of Chicago. It is said that the building contains floor space sufficiently great to accommodate the entire population of California at one time without crowding. The ground upon which it is built is a part of the city which was reclaimed from the bay and it is necessary to rest the buildings of that district upon piles.

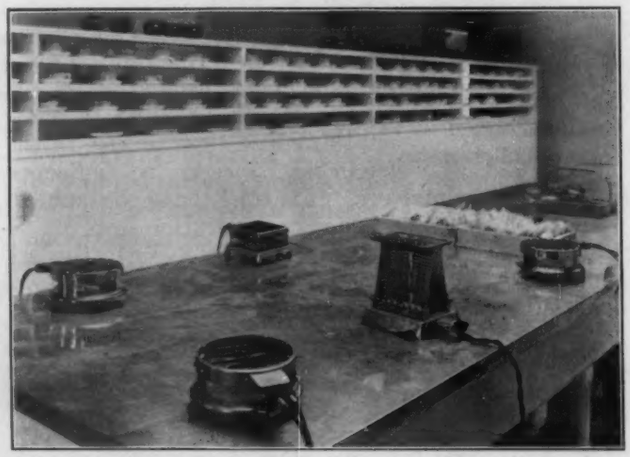


The main station of the pneumatic tube system, which interconnects all offices and does away with the necessity for messenger boys within the building.

Twenty miles of piles are said to have been driven in the construction of the Southern Pacific Building.

Aside from its size and the picturesqueness of its construction the building is of special interest from the completeness of its electrical installation. From pneumatic tubes to electrically operated elevators, electricity is used wherever possible. Clocks are electrically operated, the building is provided with an electric fire alarm system, the water for use throughout the building is electrically pumped, and the air electrically renewed.

One of the most interesting features of the building is the lighting system. Probably in no other office building of its size have the excellent results been obtained at a less expense, with no impairment to the effectiveness of illumination. In the first place, of course, spacing and candlepower were very carefully figured to obtain even and adequate distribution of light, but the fixture itself is the factor of particular interest. The Southern Pacific Company has innumerable buildings scattered throughout the West, from stations to warehouses for which it is responsible for the supply of fixtures. This item therefore becomes a very large one in its orders—and owing to the variety of tastes among those who made the choice of these objects, a very troublesome one. In order to simplify the matter and to reduce this element to a standard item, a uniform design was chosen for all Southern Pacific buildings. The advantages of this system are obvious. Not only are shades obtained at the cheapest price and replacements easily cared for, but any lights dismantled need not go into the scrap heap but may be put into the stores for use elsewhere. The system of



The lunch room of the S. P. building is known as one of the most well managed employes' dining room in the West. Electric appliances are provided for the convenience of girls wishing to add to their lunch from home.

lighting adopted is the semi-indirect with neat pressed glass bowls which fit appropriately into any surroundings.

The pneumatic tube system is of particular interest. There are many occasions in which correspondence or other papers must be transferred from one office to another, and to save the excessive traveling about the building and the cumbersome nature of any delivery system devised, tubes are provided connecting all the offices. That is to say, tubes connect all offices with the main station where the carriers are redirected and sent to the office marked. By revolving the cap until the indicator points to the required number, any office may be designated as its destination. The receiving station in each case is a conveniently located niche in the wall with a space below for receiving the carriers. The system has proved eminently satisfactory and requires only such attention as the few attendants at the main stations give in redirecting the carriers. An interesting feature was the method of locating the various stoppages which occurred when the system was first installed. The suction element proved too alluring for various of the younger members of the organization who tried its effect on other objects than the regular carriers, with the natural result that the system temporarily ceased operating. With genuine ingenuity, the vacuum cleaner was applied to the balky tube and the various objects abstracted. In some cases, however, the stoppage proved too stubborn and it became necessary to dig in through the wall or floor at the proper spot and open up the tube. After the first few days no difficulty was experienced with the system. The motor which provides

the exhaust for the pneumatic tubes is located in the basement and so arranged that it varies with the load. Any object blocking the passage of the tube, that is, mechanically affects the speed of the motor and thus increases the exhaust.

The clocks of the building are also electrically operated and governed by a master clock located on the ground floor. There are twenty-four in all and several time clocks which are connected in this same system.

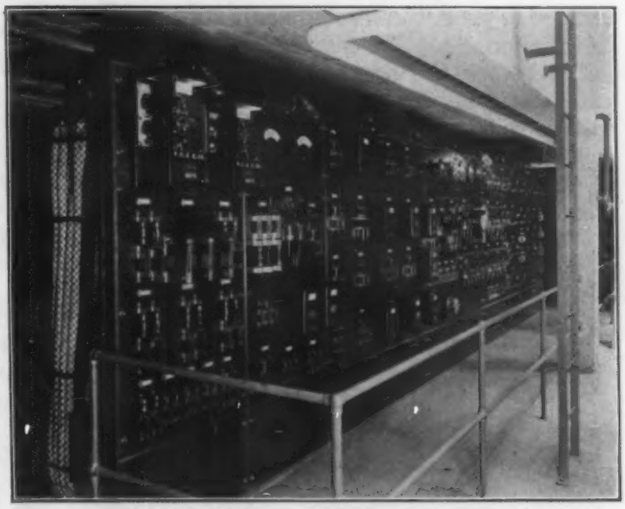
An important part of the electrical installation is the provision for pumping water. One pump is used for filtered water and one for the storage tanks on the roof, of which the overflow is used for flushing and the like. The ordinary run of water pumped is about 28,000 gallons in eight hours—and it has run as much as 50,000 gallons in twenty-four hours. An interesting feature in the handling of water is that the level of the basement is below the city sewer system, and in consequence all water used here must be pumped up to this height. The walls are painted up to this point to mark the level. A deep well was sunk 300 feet below the building and a pump installed with a view to furnishing water for the storage tanks, but there was found to be too much sand present and the project was abandoned.

The building is electrically cleaned and ventilated. One vacuum cleaner machine suffices, with outlets on each floor. The ventilator fan is located on the eleventh floor and is of the exhaust type. It serves to ventilate the three floors where large departments are located and the continuous change of air is an essential. The exhaust pipes lead along the ceiling of the second floor and thus to the outside.

A service department is provided for women employes of the building on the top floor where there is a library, rest rooms and a lunch room and kitchen. The coffee receptacle is steam heated, but several electric toasters carry out the electrical idea in this department. With the extremely large number of young women employed in this building, it was, of course, something of a problem how to handle them efficiently during the lunch period. This was eventually accomplished by staggering their rest hours, releasing a group every ten minutes from 11:40 to 1:00. In this way the kitchen is kept clear and the girls find both space and time for a comfortable meal.

The main switchboard is located in the basement in the main engine room. The d.c. side carries the current used for the various motors in use throughout the building. The energy for the running of the elevators does not go through the switchboard but is taken direct from the bus bar at the back to the eleventh floor where the motors are located. Very slow motors are used in this connection with a direct wind drum, 26 r.p.m. The main load is carried on the a.c. side. This governs the current for lights, dictaphones and general use. The lights are so arranged that two or three floors can be switched off at once, thus saving considerable time in a building of this magnitude. Public lights are separate so that in case of fire they will not be switched off, but corridors, elevators and main doorways remain lighted. The switchboard is provided with a peak load recorder, the records of which are of considerable interest as showing the time of heaviest burden and the effect on this of the weather and the daylight saving law.

Aside from the a.c. and d.c. service for the building, the stores and sidewalk elevators and the sprinkling system of the entire building are provided with independent service. The sprinkling system is an A. D. T. system with thermo couples. Any great change in temperature or interference with the system starts the bell to ringing in the engine room and at the same time in the offices of the A. D. T. service. Three tanks under pressure are provided on the roof of the building as part of the system.



The main switchboard in the basement. Elevators are not controlled from this board but the current is carried direct from the bus bar to the eleventh floor where the motors are located.

An especially railroad application of electricity is found in the extensive telephone system of the building. There are literally hundreds of regular telephones located within the building, and aside from that, the company has its own system which connects all offices of the company. It is possible not only to telephone but telegraph to Sacramento and other offices of the Southern Pacific over these lines, all within the company's system. A special adaptation of this is in the handling of pullman tickets. Considerable confusion used to be met with in the selling of tickets at different offices in San Francisco, but this has now been obviated by the use of the telephone. A central station handles all the business with rotating files and records at hand so that the operators may reach them conveniently. In this manner both error and delay are avoided.

There are, of course, many minor uses of electricity, such as the use for the operation of office devices and the like, which have not here been mentioned. In fact, such an office building is a small city in itself, and if there are any uses of electricity adaptable to its circumstances not yet in use, it is only a question of time and the education of the individuals concerned until they may find their place.

TELEPHONE SYSTEM OF CREDIT CHECKS

BY CLOTILDE GRUNSKY

(The department store is an important consumer of electricity in its lighting alone—but also offers opportunities for the application of electricity along other lines, as is indicated by the unique system of checking credits here described. The electrical contractor as well as the power company will find here a suggestion of what might be developed as additional business along this and similar lines.—The Editor.)

The question of credits in a large department store where there are some 150,000 charge accounts is one of the most serious problems with which the business must contend. In former days it was customary to permit unlimited accounts from all accredited customers. The individual was always investigated before the account was opened and investigated if it proved unsatisfactory and various difficulties were noted as they occurred by the credit department, but in general it was merely a question of whether the customer had an account at that store or not.

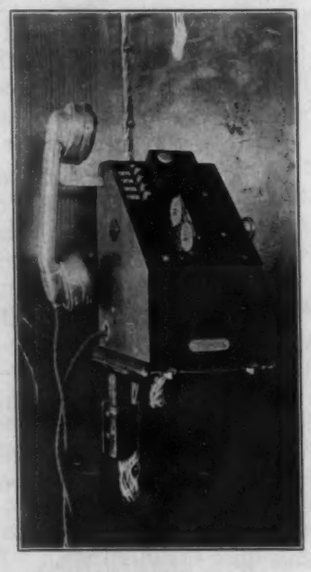
CHECKING UP CREDIT ACCOUNTS

The four circular files contain the names of all customers having charge accounts, the first two running from A-K, the second from L-Z. By pressing the button so indicated, the operator can O.K. a sales check in any department of the building.

The White House (Raphael Weill and Company) of San Francisco have solved the problem very satisfactorily by the installation of a telephone exchange in their credit department. The White House is one of the largest stores in San Francisco and some time ago felt it necessary to initiate the method of limiting accounts. Individuals who were good for a small amount might prove unsatisfactory customers if permitted to charge beyond limits, certain accounts needed watching and there came a time with some when credit was withdrawn. This system, of course, necessitated very careful checking of charges as made throughout the store.

The system formerly in use was one of automatic tubes which carried the sales check to the credit department where the account was looked up and the slip stamped with the proper O.K. if satisfactory. This had numerous drawbacks. The sales checks were often crumpled and illegibly written and there were numerous delays. It was not always possible to attend to the checks at once, the carriers piled up, they were not always handled in exact order of arrival and some one customer might become extremely impatient. Moreover the check must be handled several times and re-sent back to its original department so that there was considerable room for error.

A recent electrical installation which consists of a central telephone exchange and various stations located in all parts of the store has greatly simplified the work and made errors almost impossible. The system is very simple. The main station occupies one corner of the fourth floor where there are located cylindrical card index systems containing data on all credit accounts and where Mr. Neper, head of the department, is always at hand to decide questions beyond the province of the operators. There are 160 local stations located throughout the store where the clerk taking a charge order may talk directly with the credit department. The sales check is placed in an automatic device by the clerk and if the operator who handles the account in question finds the amount to be within the prescribed limits she presses a button which punches the sales check at the other end and serves as an official O.K.



The sales check is inserted in the machine and the button pressed which corresponds to the initial of the customer's name. If the operator at the other end finds the account satisfactory, she punches the tag to that effect. There are 86 call stations in the building conveniently located for every department.

For convenience in handling, all accounts are divided alphabetically into four divisions, each of which is indexed on two of the rotating racks. There are four stations on the main board, each of which thus handles two divisions if necessary, one regularly and one if the operator next is absent. The local stations are provided with buttons which indicate these divisions, A-E, E-K and so on. If Mrs. Brown wishes to charge a $25 hat, the saleswoman in the hat department places the sales tag in the machine and presses the button marked "A-E."

This flashes a light at the switchboard of the operator handling these accounts, white on the switchboard regularly handling this division and red on the switchboard next. At her earliest opportunity, the operator plugs in at this point, this operating a buzzer at the local instrument which notifies the clerk to take down the receiver. The clerk now gives name, address and amount of sale. The operator has an index of all accounts from A-K before her and quickly notes the one in question. If the account is clear and the charge is not an abnormal amount, the operator now presses the button which punches the check.

A further safeguard against error is the little pilot light which shows on the switchboard just alongside the button if the sales tag is correctly placed in the machine. If this light does not flash, the operator knows that something is wrong and so notifies the clerk. There are usually four operators at work, but provision is made for eight workers for rush periods such as the holiday sales, each switchboard being divided into two parts by the pressing of a button. It is further possible to concentrate all calls on one switchboard for convenience at such off hours as before the store opens or after it has officially closed when special cases may need attention.

The system of indicating accounts is most expeditious. Ordinary white cards are used as a basis with the name, address and limit to the account visible at all times. If the account is bad or other difficulties have come up, a slip of colored celluloid is slipped over this name and indicates to the operator at once the state of the account. Eight colors are used. Thus red indicates an account against which no further charges are allowed, yellow—one on which something must be paid before it is increased, green—an account against which charges have been made by persons unauthorized, and so on. Some few accounts are unlimited and are so indicated, most bear figures following the name, such as $100, $500 and the like. This indicates that the total amount of the account is not supposed to advance beyond that figure. Operators are permitted to O.K. all charges up to 10 per cent of the figure there shown without further authority. Anything beyond that or anything on a questionable account must go to the head of the department. A master telephone makes it possible for members of the credit department to switch into any conversation which has gone beyond the province of the operator.

This installation is, of course, but one feature of the credit department which has many duties, one of which naturally is to revise the ratings of accounts periodically in the light of monthly bills and payments.

The switch board is manufactured by the National Cash Register Company and installed by the Western Electric Company.

ELECTRICALLY EQUIPPED LABORATORIES

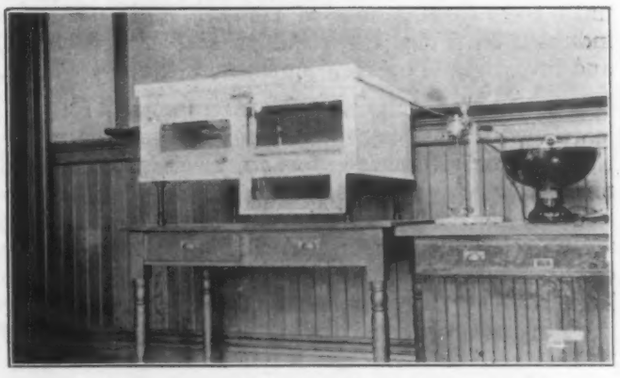
BY C. B. MERRICK

(Schools, colleges and hospitals offer opportunities for the special adaptation of electricity to laboratory needs. The following article on the electrical installations of the parasitology laboratories of the California State Board of Health, located at the University of California, suggests some of the specialized uses to which familiar appliances may be put.—The Editor.)

Service and adaptability in the real meaning of the words, are the characteristics of electricity that recommend it so highly for use in bacteriological and hygienic laboratories. The special purposes to which it is applied call for compactness, reliability, and readiness for use at all times. That the method electrical fulfills these exacting conditions is readily shown by its increasing popularity and extended use. New and better equipment aid progress in scientific research, and to the extent that electricity surpasses other methods, just so far is the nation indebted to electricity for the marvelous secrets disclosed by her investigators.

Electric Incubator

At the parasitology laboratories of the State Board of Health of California, on the campus of the University of California, a standard Petaluma Electric Incubator has been fitted up with special trays as required and is used in the incubation of the eggs of the hook-worm. That it can be entirely relied upon for accomplishing its work is shown by the satisfactory results obtained and the detailed records of its action kept for a period of more than six months. In the photograph this laboratory incubator is shown with one of the doors open, revealing the thermometer and pilot lamp at the extreme left of the open space. At the top can be seen the heating coils, and in the center, the thermostat which is the master mind of the equipment. The thermostat controls the contactor located just below the incubator, which in turn regulates the flow of current



Petaluma electric incubator for hatching hook-worm eggs

through the heating coils. The pilot lamp is connected in parallel with the coils and flashes on each time the coils are connected to the line, thus indicating whether or not the machine is working properly.

At the right of the photograph is shown the centrifuge which is used for concentration purposes.

The electric motor gives the high rotational speed and consequent centrifugal force necessary for settling the heavier particles from the liquids in which they are suspended. The stirring device with the motor attached assists as a time saver, also, by being continually ready for use, as soon as connected by merely pressing into position.

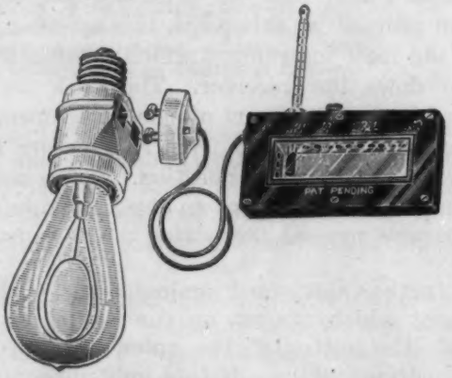
Hatching Bacteria

In the second photograph is shown at the right a Freas' Electric Incubator, particularly for incubation of bacteria and protozoa, with readily adjustable temperature control at the top center of the incubator. This control may be set to automatically maintain any given temperature merely by setting the knurled button at the desired position. The second oven shown is a Paraffine Oven in which the paraffine is prepared for embedding and infiltration of tissues. It is difficult to conceive of the possibility of slicing tissues to a thickness of only .001 millimeter and without this process it undoubtedly could not be a success. By infiltration of the tissues with melted paraffine, and allowing the paraffine to solidify, they can be placed in the microtome and the layers of the above thickness sliced off by means of a razor-edged knife. Here again electricity plays its part, for the microtome is run by a motor. As the slices are cut each adheres to the one previously cut until they form a sort of ribbon. This ribbon is mounted on slides, the paraffine stained as desired, and investigated by viewing through the microscope.

Electric incubator and paraffine oven for the infiltration of tissues. This makes possible the slicing of tissue to the thinness of .001 millimeter for the preparation of slides.

Electricity and the Microscope

Even the microscope has not escaped the attention of the electrician, for an electrically heated microscope stage is used for research work on particularly sensitive bacteria, some of which would die if subjected to an extended change of temperature of two degrees from normal. Thus it is necessary to keep them at normal temperature in order to observe their natural characteristics. This is accomplished with the aid of the stage, which as indicated is connected in series with a lamp so that the current flowing through the lamp also flows through the heating coils of the stage. A thermometer indicates the temperature, so that the operator can maintain it at the required value. Electric light for illumination of the slide in the microscope is preferable to daylight illumination because of its greater uniformity and constancy, as well as its easier manipulation for showing the minute details of the subject under investigation. Consequently it is used almost to the exclusion of daylight.



An electric warming stage for keeping bacteria or protozoa warm while examining them under the microscope

Thus electricity is coming to play a more and more important part in the scientific field as well as in the home and industrial field, and is constantly demonstrating the convenience and necessity of its use. With the constant acceleration of present times, its advantages become more apparent.

SERVICE INSTALLATION REQUIREMENTS

(A recent ruling of the San Francisco Department of Electricity on the separation of power and lighting loads which is of interest for purposes of comparison and reference.—The Editor.)

1. In each installation where there is a connected power load of 5 h.p. or more (in addition to a lighting load), provision shall be made for separately metering such power load.

2. In each installation where there is a connected heating load of 5 kw. or more (in addition to a power or lighting load), provision shall be made for separately metering such heating load.

3. In new installations, separate services may be installed for the lighting load and the power and heating loads. Each separate service shall supply the entire lighting load or the entire power and heating load in the premises.

4. In old installations where additional lighting or power utilization equipment is installed and the existing service is insufficient to carry the total load, including the increase, an additional service may be installed. Such additional service shall be of sufficient capacity to carry the entire lighting or power and heating load in the premises. The new service shall extend to the existing meter location and the necessary changes made for separate supply and metering of lighting or power and heating loads.

5. A single service switch shall not be required for the entire load, but each service shall be provided with a main service switch entirely disconnecting all the wires of that service.

6. Where separate service switches are provided for lighting or power and heating loads, the legend, "Lighting," "Power" or "Heating," as the case may be, shall be placed on the outside of the cabinet in letters similar to the requirements for service switch lettering.

HUMAN NATURE IN ADVERTISING

BY H. A. LEMMON

(It may not be complimentary to say that the advertising man has learned what he knows from Satan, but it is merely another way of saying that he deals in human nature. When you advertise the comfort that the electric heater is to bring the customer, rather than so many feet of cord and wire coil which are to be obtained at such and such a price, you are using the methods which have won out in the conflict of human character from time immemorial. The author of this entertaining parable is sales manager with the Truckee River General Electric Company.—The Editor.)

Some things seem to need no advertisement—but in reality what we know as human nature is merely responding to the most alluring bid of the moment.

EVE could have told you that the patron saint of all builders of advertisements is one Mephisto Beelzebub Satan. In all Creation he is the master wizard of publicity, and if we might but study his methods we need search no further for that wisdom which never fail us.

When the Lord created Eve he undoubtedly intended that she should eat the apple—eventually — otherwise he wouldn't have created the apple. He had given to Adam and Eve—those specimens of what was later to be the human race — every material thing in existence, and made it available to them without effort. But there was left out of them those great energizing forces of individual initiative and ambition which go so far toward character building. These were incorporated in the apple. They were withheld from Adam and Eve for the purpose of interposing a slight, and by no means insurmountable, obstacle to their attainment, and included in the rules of the game were certain apparent penalties for the purpose of establishing as early as possible that great fundamental truth that we must pay for any worthy thing we may gain by sacrifice of something which we already have. And it was disclosed to Eve that if she were prepared to pay the price she could gain, in return, "knowledge."

The First Advertisement —

This promise of the great boon of knowledge in trade for individual sacrifice constitutes, I believe, the first advertisement of which we have any record —but it was pitched upon too high a plane and was out-of-date even then. It stimulated no desire in Eve and she neither bought nor bit. Subsequently Adam and Eve continued to live a life of idleness—both mental and physical—without reason and for no apparent purpose—a condition we sometimes momentarily envy but one which is instinctively abhorrent.

Mr. and Mrs. Adam, as a matter of fact, were existing in an atmosphere of "what's the use." They had no memory of yesterday because yesterday was but as every other day which went before; they had no interest in today because today could be but twenty-four hours more of individual inaction; they had no concern for the morrow for tomorrow would bring no responsibilities, no new pains, no unexpected pleasures and no soul-trying disappointments.

A stroll throughout their perfect domain was invariably barren of adventure or thrill, for even the beasts were friendly and simple; the magnificent trees breathed no whisper of their divine being, and neither the birds nor the flowers could impress upon human understanding the glory of their gorgeous beauty. Incapable of emotion, life to Adam and Eve

Labelling the apple tree "Tree of Knowledge" was perhaps the first advertisement—but it was unsuccessful. Why should Eve eat an apple? It was not until Satan stimulated her imagination by pointing out the advantages to be gained that she was interested. He has been disposing successfully of even doubtful wares by the same method ever since.

was as interesting, as exciting and as necessary as it is to an angle worm.

And yet, why eat the apple? There was an infinite variety of fruits easily available which were satisfying, as experience had demonstrated, while the apple promised only "knowledge," an indefinite thing not known to be desirable, even.

The advertisement failed; it was foredoomed to failure just as it will always fail.

A More Successful Attempt —

And then there came upon the scene Mr. M. B. Satan, who had ideas of his own. Satan's position in the Divine scheme at that time is not clearly revealed to us but there is no reason we should consider his reputation as other than fair to good, a little wild, perhaps, but withal a young man of tremendous energy and enthusiasm, who friends predicted would make his way in the world and later on be heard from. Satan appraised the situation instantly and discerned wherein that first advertisement had failed. It didn't stimulate Eve's imagination; nothing ever had stimulated it, and nothing ever would have under the then existing circumstances. So he first set himself the task of developing that god-given quality in that first woman. He did this by a series of confidential conversations—got Eve off by herself, not conspicuously in a manner to create scandal, but discreetly, and he began to put notions into her head which fanned the spark he found slumbering there. And then—and only then—did he pub-

lish his advertisement—the second in the history of mankind.

The Picture of the Result —

He didn't merely promise "knowledge" if Eve would abandon her perfect, ready-made home and take up a life of toil; he didn't tell her she would grow old and withered and eventually would perish; he didn't dwell upon the fearful price she would have to pay in return for something she did not know she desired; but instead he painted a picture on her brain, mixing his colors with the imagery of her own imagination. He painted a picture of days of happiness and never-ending delights; of character-developing sorrow; of days of healthful, satisfying

Mr. Mephistopheles does not advertise the price of his wares, but the delights to be attained through their use. The moral of this little homily on human nature is to be seen when you apply the principles to selling—say, a vacuum cleaner. It is the clean house and the health of the baby and the freedom from drudgery the housewife buys, having forgotten in the delights of her picture the number of dollars she must give up to attain it.

weariness closing in complacent repose; of the companionship and the dangers of the beasts, no longer to be friendly and all alike; and he gave her a glimpse into that hitherto unexplored magic realm of appreciation and imagination—the music of birds, the beauty of gorgeous flowers, the inspiration of love, the glorious destiny of motherhood, and then, finally, when contentment and weariness had blunted and softened the joy and the pain of the great adventure, the peace of death.

And Eve bought and ate the apple; just as she has been doing ever since, and just as she always will do so long as she may have a place upon this earth.

Now it happens that that advertisement was the product of a new and hitherto untried school, and although centuries multiplied by centuries have since proved it to be the only type worthy the great artist, it was considered unethical at that time, with a result that its author was thrust out of the Divine Galaxy and forced to shift for himself in the guise of a serpent.

A Good Thing Misused —

We are not called upon to pass judgment upon Satan's subsequent career, even though we may feel that he acted hastily—took his banishment too seriously. Undoubtedly he was a young man of morose and sensitive temperament, as indeed is common with geniuses; but we can at least give him credit for playing the game in the open. At no time has there ever been any mystery, any concealment of his plans or his methods, and to the latter we owe all we have learned and all we ever will learn about effective, creative advertising. And in any event let us not be unmindful of the fact that Satan gained for mankind that which we must ever esteem the highest of all gifts—appreciation and imagination.

But to return: Satan swore a terrible oath that he would prove to all the universe, first—that the snake is the king of beasts and second, that his methods, instead of being unethical are fundamental —the A, B, C of all human achievement. And he wagered the most precious thing in his possession. Having given a soul to man by imaginative advertising, he turned him about and began to rob him of that gift by precisely the same agency.

But It Works —

Much has been said pro and con regarding Satan's domestic affairs, but we are concerned only in a critical analysis of the means by which he secured such unvarying results. As advertising men we must pay our homage to success.

His methods are plainly written in every step of the wanderer's path; in every line of the failure's face; in every eye of society's victims, and in every hour of the criminal's hell. He offers to all who may wish to buy, prosperity and happiness—with never a word about the price to pay.

He doesn't sell wine to me as wine. Instead he offers relaxation, merriment, congeniality. He doesn't tell me that I may obtain these things at a bargain price of so many hours of drugged vitality, so many more of remorse, and still so many more of sacrifice of essential things; instead, his advertisement appeals to my imagination until everything gross and everything sordid is obliterated by a glorious vision of exhilaration.

He doesn't paint a picture on the brain of youth of prison bars, desertion by friends, unutterable misery for loved ones, as the price he must pay for that money which belonged to another. Instead he uses the vivid pigments of his artistry in portraying the joy possession of that money will bring.

Its Application —

And so he goes on, playing up and down the scale of human emotion—visualizing adolation in this advertisement; happiness and contentment in that one; dignity and respect in this other one—proving over and over that he has solved the problem of selling his wares—and wondering why we do not read the lesson: Reject his methods, but adapt the underlying principles to the benefit of those we wish to serve. Why do we persist in selling apples, when we might as well be selling human experience?

TELEPHONING FROM THE TRAIN

The train telephone for voice transmission between a moving train and a dispatcher's office has been given official tests in Canada and has demonstrated its efficiency. The device worked successfully in connection with trunk line telephones in general commercial service, and also between a car of the train and the locomotive. The transmission is made through wheel and axle, without the aid of a contributing medium.

PLANS FOR THE CALIFORNIA CAMPAIGN

(The California Cooperative Campaign has proved itself a success in such a concrete way that its work is to be extended and intensified for the next year. The scope of the plans for the immediate future are sketched in the following extracts from the report of the Advisory Committee. What some of the electrical men who have come in contact with the working of the campaign can say of its accomplishments is to be judged from the letters from contractor-dealers, jobbers, central station men and manufacturers which follow.—The Editor.)

Because of the need for conservation during war time and because of the great difficulties being encountered in helping the contractor-dealers with their educational development, there were some who suggested during July and August that the California Electrical Cooperative Campaign should be discontinued. It was seen that some of the contractor-dealers were becoming discouraged and that the continued existence of their association was endangered.

The Advisory Committee very carefully reviewed this situation and discussed it at its meeting in Fresno in August. The Committee decided that every effort should be made to hold the contractor-dealers' association together, and to encourage the individual contractor-dealers to maintain themselves in business by directing their efforts toward work which would help win the war.

Papers for the get-together meeting at Los Angeles on October 4th were carefully written by individuals and edited by the Committee with this decision in mind. The members of the Committee, without exception, felt that they would be failing in their duty to the industry if, at this critical time, they failed to do their utmost to direct the resources of the industry in California toward winning the war and toward holding associations together so that the efforts of the individual member might bring the greatest results, not only during the war but in the readjustment period after the war.

This decision and action by the Committee has been favorably commented upon by those contributors with whom it has been discussed. The members of the Advisory Committee feel that all contributors will endorse it.

The war is now over and in contrast to the abandonment of association activities in many other trades, the California Association of Electrical Contractors and Dealers is still in existence and stronger than ever, and the organization of the California Electrical Cooperative Campaign is intact and in operation. There exists therefore an organization which has weathered adversity and which has a firm foundation on which to build further cooperation work and thereby give assistance to the various branches of the electrical industry in California during 1919.

The Advisory Committee is in much better position to give assistance in the educational development of the contractor-dealers during the present period of readjustment and the periods of active business thereafter because of the continuance of its operations during the past year.

Contributors Pleased with Work of 1918

Another evidence of the success of the campaign is the readiness with which the contributors to the fund have renewed their contributions for the year 1919. The California Association of Electrical Contractors and Dealers, the Electrical Supply Jobbers of California, and practically all of the central station companies have renewed their pledges.

The original plans as drawn in 1917 provided for the participation of these three groups only, but at the last minute, in order to complete the funds to the estimated amount required, five manufacturers were invited to contribute to the aggregate amount of $1320. Three of these have subscribed increased amounts for 1919, and the other two have subscribed the same as in 1918. The Committee felt that there should be a more general participation by the manufacturers and to that end electrical manufacturers generally have already been, or soon will be, given an opportunity to subscribe. Twenty manufacturers have to date subscribed a total amount of $3250 to the 1919 fund.

It was also decided to add another manufacturer representative to the Advisory Committee. The appointment of Mr. K. E. VanKuren, District Manager, Westinghouse Electric & Manufacturing Company, Los Angeles, California, has been approved by the Executive Committee of the Pacific Coast Section, N. E. L. A., the Executive Committee of the California Association of Electrical Contractors and Dealers and by the authorized representative of the Electric Supply Jobbers of California.

Field Work to Be More Intensive

During the year 1918 decidedly better results were obtained in the southern section than in the northern part of the state. This was due in no small measure to the fact that Mr. Spring was able to do more intensive work there than could Mr. Brainerd in the northern section, which includes approximately twice the area and population. The Committee considers that it would be unwise at this time to decrease in any degree the active work of Mr. Spring in the south by assigning more territory to him. Indeed, it is considered necessary that all sections of the state should be given the same intensive attention. To that end a third field representative will be added as soon as a man satisfactory to the committee can be employed.

A portion of the large territory now handled by Mr. Brainerd will then be handled by the third field representative.

The plan, started in October, 1918, of furnishing suitable advertising copy to central stations and of encouraging dealers and contractors to tie-in with the central station advertising by doing more advertising themselves, will be continued on an even larger scale. The results so far secured fully justify this action.

The report has shown how, responding to the campaign suggestions, dealers and contractors have become more active and aggressive in going after the business. Some have added solicitors to go out

and sell appliances. Many dealers have not the field in which to properly use a solicitor's services continuously, but would use one for short periods at intervals throughout the year. In order to supply these dealers with high grade solicitors, the Advisory Committee will organize a staff (one, two or more, as may be necessary) of competent, experienced solicitors. These trained men may then be employed by various dealers on a compensation basis approved by the Advisory Committee. Dealers should be able to materially increase their appliance sales by making use of this particular campaign service.

Exhibition Assistance Planned

The Committee will also organize a Demonstration, or Electrical Show Staff to meet demands for assistance in the operation of cooperative appliance campaigns and demonstrations.

The contractors, dealers and central stations who cooperate in putting on an electrical show, demonstration or campaign, will be required to pay for the trained demonstration services. In this, as in the case of the solicitors, the Advisory Committee expect to pay from the campaign fund only organization and general supervisory expenses.

The individual firms using the services of the solicitors, demonstrators, and show organizers, will be required to pay the main items of salaries, commissions and traveling expenses. These plans are advantageous in that well trained and experienced assistants can be secured by the contractor-dealers for short periods at reasonable cost.

A Salesmen's Auxiliary Planned

A greater and more general use by the dealers of the appliance sales report is very much desired. To assist in encouraging the dealers to use and to send in these reports and to assist in such other work of the campaign as may be from time to time delegated to them, a Salesmen's Auxiliary will be organized. It will be composed of traveling representatives selected from the organizations of contributing jobbers and manufacturers and who, with the consent of their principals, will in addition to their regular duties give some special attention to the work of the campaign.

The Salesmen's Auxiliary will be a fully organized body with a chairman, three vice-chairmen, and a secretary, reporting and responsible to the Advisory Committee. A salesman may be appointed to membership in the "Auxiliary" by a two-thirds vote of the Advisory Committee, the approval of his principal having been first obtained.

This auxiliary will perform such duties as may be assigned to it from time to time by the Advisory Committee.

Throughout 1919 it will be the earnest endeavor to bring about every condition within the power of the Advisory Committee that will tend toward building up the contractor-dealer. To that end the Field Representatives will continue their endeavor to add to the membership of the California Association of Electrical Contractors and Dealers. As this association is of a permanent nature and one in which the main object is the development of its members by educational methods, the Advisory Committee feels it desirable to increase that association's membership to the greatest possible number so that the educational work undertaken by the Committee may be carried on and cover the broadest possible field when the Cooperative Campaign shall have accomplished its purpose.

The service of the Electrical Industry to the people of California must be still further improved and enlarged if our industry is to share to the greatest degree in the prosperity that is to come during and after the readjustment period. Cooperation and educational development are the means by which to ensure this improved and enlarged service. The contractor-dealer particularly needs to develop in this direction. Cooperation in its broadest sense should be his during 1919. The California Electrical Cooperative Campaign is in a position to bring this about to a much greater extent than ever before.

LETTERS ON THE COOPERATIVE CAMPAIGN

The Central Station Satisfied

S. Waldo Coleman, president and general manager of the Coast Counties Gas & Electric Company and a careful student of the relations of the power company to the public, writes of the Cooperative Campaign:

Though the contractor-dealers in our territory and ourselves have cooperated well together in the past, yet this cooperation has been increased by the mutual education received from the California Electrical Cooperative Campaign. We have especially appreciated the very successful work of the field representative, Mr. Brainerd.

Our company, having entirely withdrawn from the sale of electrical appliances, looks to the contractor-dealer as our "New Business Agent," so considering the electrical industry in its entirety, this places the responsibility of the retail sale of electrical appliances strictly up to the dealers, so that we are more interested than ever in aiding in their development as electrical merchants.

This company is entirely satisfied with the results of last year's business, and as you know we have already signed up for the coming year.

Yours very truly,

COAST COUNTIES GAS & ELECTRIC CO.,
S. WALDO COLEMAN,
President and General Manager.

The Jobber Approves

C. B. Hall, secretary and treasurer of the Los Angeles branch of the Illinois Electric Company, speaks from the standpoint of the large jobber in his cordial support of the campaign. He says in part:

The work of Mr. A. L. Spring, field representative in this territory, has acquainted the contractors and dealers with the meaning of the word "cooperation" to an extent which I believe would have been impossible in any other way. My observation of a limited number of stores and store windows I have had an opportunity to inspect, leads me to believe he is certainly on the right track. The friendly spirit he has been largely responsible for arousing among the dealers themselves and with their local lighting office is of itself of no little value.

It is only by exchanging ideas and a "get-together" spirit that any appreciable progress can be made in any line of business nowadays, and this is particularly true of the

ever-changing methods of the electrical industry. The co-operative spirit shown by the central stations in their attitude towards the contractors and dealers means more for the future than most of us realize.

One of our large dealers in this city recently mentioned to me the fact that for the first time two large annual electric installations had been made by the contractor, in contrast to the work being done by central stations in the past, with satisfactory results to all concerned.

The merchandising policy of the central stations is beginning to make the dealer realize he is now in a fair way to become a real merchant. The stimulation of the dealer and contractor in newspaper advertising is of itself a big factor in the advancement of the electrical business. This should be encouraged to the greatest extent possible.

If the large manufacturers have seen the wisdom of this sort of thing in the big magazines, it goes without saying that local work can be done just as satisfactorily.

"LET THE GOOD WORK GO ON."

Yours very truly,

C. B. HALL.

Lee H. Newbert, chairman of the efficient Advisory Committee which has supervised the California Electrical Cooperative Campaign during the past year. The work has achieved such definite results that its scope is to be deepened and expanded for 1919. The committee has the following membership: L. H. Newbert, Commercial Department Pacific Gas & Electric Co., Chairman, D. E. Harris, sales manager Pacific States Electric Co., R. M. Alvord, manager supply department General Electric Company, M. L. Scobey, manager Home Electrical, San Francisco, G. E. Arbogast, president Southern California Contractors and Dealers' Association, K. E. Van Kuran, Los Angeles manager Westinghouse Electric & Manufacturing Company, A. E. Wishon, assistant general manager San Joaquin Light & Power Corporation, A. W. Childs, assistant general agent Southern California Edison Co.

Encourages Individual Effort

M. A. De Lew, president of the California Association of Electrical Contractors and Dealers, foresees good effects from the campaign far beyond the limits of the state:

The committee has in a very large measure accomplished its primary purpose—the coordination of effort of men in the electrical industry.

The word cooperation has of late been so largely used in a socialistic sense that the misgivings of some have been the cause of the undertaking and the accomplishment of real difficult work. Cooperation as it is understood today and as it must be understood in the future is the very highest degree of "Capitalism," thus its success can only be assailed by the knave and his efforts can be but a retarding action.

To my mind the plan has been and will be such a complete success that but few of us can anticipate its bearing on the whole electrical industry throughout the entire nation.

It has not only been eminently successful in its primary object of coordination of effort, but has also seen the seeds of its labors bear fruit. In spite of the sacrifices made by all electrical men during the war every branch of our industry stands today even on more solid ground. No doubt, in a measure, about all of us have been hit financially, but our principles have taken firmer root—the dollar does not stand between the principles of American citizenship and ourselves. The broad principles of cooperation as taught and enunciated under the guiding spirit of the Campaign Committee and its many adherents are very largely responsible.

That the power companies, the manufacturers, the jobbers, the contractors and the dealers not only have seen the light of cooperation and followed its precepts, but are contributing to the funds for its extension in increased amounts, speaks in far more eloquent words than your humble servant can pen.

My observation of the Board having this undertaking in charge is somewhat limited, yet I can safely say that the old adage of "putting your shoulders together" does in no wise apply—they are putting their brains together, in fact, the Advisory Board are a real example of "cooperation."

Sincerely,

M. A. De LEW.

A. L. Spring and W. H. Brainerd, who have acted as representatives of the California Electrical Cooperative Campaign, respectively in the southern and northern divisions of the state. The work has been so satisfactory that C. C. Davis, formerly connected with the Pacific Hardware and Steel Company and the General Electric Company of San Francisco, has been appointed a third representative to specialize in the San Francisco district. It has further been decided to add an assistant to the representative in the southern district.

The Manufacturer and the Campaign

Dr. Addison, Pacific Coast manager of the General Electric Company and looked upon by many as the dean of the industry in the West, is in hearty accord with the work of the campaign:

I think I have been trying to preach cooperation for a quarter of a century. Not because of my preaching, but because it is the inevitable thing leading to the highest efficiency of all-round prosperity, it has for the past few years been coming along very rapidly.

I agree with you that the California Electrical Cooperative Campaign is a good thing and ought to be continued.

Very sincerely yours,

Th. ADDISON,
Pacific Coast Manager.

Money Well Invested

S. M. Kennedy, general agent for the Southern California Edison Company, who has built up a national reputation for himself in the handling of problems of electrical merchandising, speaks for the central station in the southern portion of the state:

This company has been keenly interested in the Cooperative Campaign, and those in authority have felt that the money contributed toward carrying on the expenses has been well invested. The company has signified its willingness to continue its contribution for the year 1919 with the expectation that the work will be as carefully planned and carried on as during the present year. It is our opinion that the same amount of work next year will produce results that will be even more satisfactory than those of 1918.

With kindest regards,

Very truly yours,

S. M. KENNEDY,
General Agent.

From the Contractor-Dealer in the City

J. C. Hobrecht, one of the live business men of Sacramento and active in contractor-dealer organization, feels that the campaign has made an excellent beginning, worth pushing with even greater energy:

In the earliest of recorded history we have the story of a man who said, "I am not my brother's keeper," and it is further chronicled that this man became an outcast and a wanderer upon the fact of the earth.

Coming down through the ages, some of the spirit of this man has lingered in the race and from time to time great men have arisen and great movements have been put under way to combat and eliminate this spirit; so it was that when big, unselfish men in the electrical industry saw this spirit of Cain even among their own associates and brothers in business, they arose and determined upon its eradication, and as one of the means to this end came into being the "California Cooperative Electrical Campaign."

Just how far and in what manner it accomplished its purpose, it is not possible to discuss in a short letter. The very apparent results, however, should be enough to convince the leaders in the Campaign that their efforts were appreciated and encourage them to further good work along the same or improved lines.

The experience of the past year has been valuable; there has been some criticism, justifiable and otherwise, but the one was welcome and the other expected; that, however, does not alter the fact that the electrical industry is on a better basis today in California than it was a year ago, and much of this can be directly traced to the California Cooperative Campaign.

The very fact that men from all the branches of the industry were willing to put their money into a common pot to be spent for the common good shows conclusively that they believe in the interdependence of the various branches and that only through cooperation can the best service be given.

"Service" — that word is the keynote of the whole campaign; the service that it renders humanity is the only excuse for existence of any business or industry. Profit is result of service and is determined in the end by the efficiency, quality and quantity of service. We will all agree on the point that we could render a great deal more and better service if the public only knew what we could do for them; right here is where the advertising feature of the Cooperative Campaign steps in. Results here are not always as apparent as the weak-hearted ones would like to have them, but they are the surest and most lasting. But as the electrical industry is rather new in the advertising business, let us remember a recognized axiom that "A weak-hearted man should never start advertising." Now is the time of test,—shall the electrical industry come out as strong-hearted men with vim, vigor and pep, or shall we drop back into the groove of: "Everyone for himself and let the Devil take the last"?

The writer believes, now that we have the spirit of Cain on the run, let us keep him going; let us go to the Cooperative Campaign with redoubled efforts; let us be big enough to forget the little mistakes, the local or personal slights, if we feel any; let us look with a broad vision upon the results, and not feel only in our own pocket for them.

There is no doubt the Campaign has been a success; there is no doubt it can be made a greater success. The experience of the past Campaign should be capitalized; let us not lose what we have gained—let us go to it again with a "strong heart."

Yours very truly,

J. C. HOBRECHT.

The Contractor in the Smaller City

S. F. Jones, of the firm of Winder and Jones, electrical contractors of Covina, tells what the Cooperative Campaign has meant in the intensely developed citrus belt of southern California:

We have watched with considerable interest the progress of the California Electrical Cooperative Campaign in this section and the following are some of the results it has accomplished.

The retail electrical business has been made more attractive to the contractor-dealer by the central stations changing their methods of merchandising appliances. While they have been in the past in unfair competition to the contractor-dealer, they are now selling on an ethical retail basis, which has encouraged the dealer to put more effort into his retail business. We have also noted with pleasure that we are receiving improved cooperation from the central station in our section in connection with our contract work.

We find that the campaign has stimulated the contractor-dealers in their efforts to secure profitable business and the manufacturers and jobbers have been influenced by this activity to such an extent that they now put forth efforts to help contractor-dealers secure business. Where we formerly came into competition with the manufacturer or jobber whose goods we were selling, we now find that they are cooperating instead of competing with us.

The campaign has been of great benefit to us in improving our selling and bookkeeping methods. Its field representative in this section, Mr. A. L. Spring, has given us a great deal of valuable assistance and advice regarding merchandising of electrical appliances. He has assisted us in laying out our new store into which we expect to move within the next two weeks. In planning our windows at the new store, we had just accepted a straight front design, when Mr. Spring came along and told us we were all wrong and insisted that Mr. Winder and myself spend a half day with him in Los Angeles going around to different electrical stores, seeing the show window arrangements. Before he got through with us he had us convinced that he was right and we built our show windows after his suggestions and are very well pleased with them.

Before the campaign started there were no members of the Electrical Contractors and Dealers' Association in this vicinity, while now we are all members and cooperating nicely.

We are extremely well pleased with the results of the campaign and believe its continuance for another year or two will be a great benefit to the industry and will bring about a condition that will justify the central stations withdrawing from the appliance business and put the contractor-dealer in a position to properly handle the retail distribution of electrical merchandise.

Yours very truly,

WINDER & JONES,
S. F. JONES.

Pleased with Accomplishment

H. B. Woodill, president of the Woodill & Hulse Electric Company of Los Angeles, speaks in hearty commendation of the results achieved:

I know that the Campaign in the last year has done what some of us have tried to bring about in the past fifteen years, therefore my saying that I am pleased with it is certainly putting it very mild. Cooperation has finally taken on its characteristic meaning as far as the Electrical Campaign is concerned.

Yours very truly,

WOODILL & HULSE ELECTRIC CO.,
H. B. WOODILL, President.

THE STORAGE OF ELECTRIC SUPPLIES

(The storage of electric supplies which vary from washers to conduit and rolls of wire in a way to secure dispatch in handling as well as an attractive display of the stock is a difficulty presented not only to wholesalers and jobbers but to retail dealers as well. The new office and warehouse of a San Francisco wholesale firm are examples of what may be done along that line.—The Editor.)

The storage of material of diverse weight and bulk, usually in the dark recesses of a basement store room, is one of the major problems of the wholesale dealer in electric supplies. The new offices

No open packages are allowed on the two main floors, but when such occur are stored on the shelves on the mezzanine floor which is to be seen in the picture. Stairs lead from both front and back, and a chute and heavy freight elevator provide facilities for handling even heavy materials.

and warehouse of the Baker-Joslyn Company at First and Howard streets, San Francisco, have been arranged with a view to the greatest convenience in handling and shipping goods.

The main feature of the building is its light. It is an attractive concrete structure providing two main floors and a mezzanine, so built that practically the entire outer wall space is of glass. This means that artificial illumination is necessary only on very dark days or after nightfall, it avoids any confusion, makes for ease in handling materials and insures against accident of any sort.

The offices are located in the front of the main floor and carry out the idea of light and convenience. They are separated by glass partitions, protected by sash curtains up to sufficient height to give privacy and protection from the sun. Woodwork is in a light finish and the open spacing of desks and records presents a most orderly and attractive appearance. A rest room has been provided for the women employes with table and wicker chairs and cloak and rest room facilities, where it is possible for the employes to eat their lunch. Electric appliances for the making of toast and hot water are provided for their common use. Adjoining this is a small store room for office materials and old records which are kept neatly in files and in enclosed cupboards so that they are well protected from the dust.

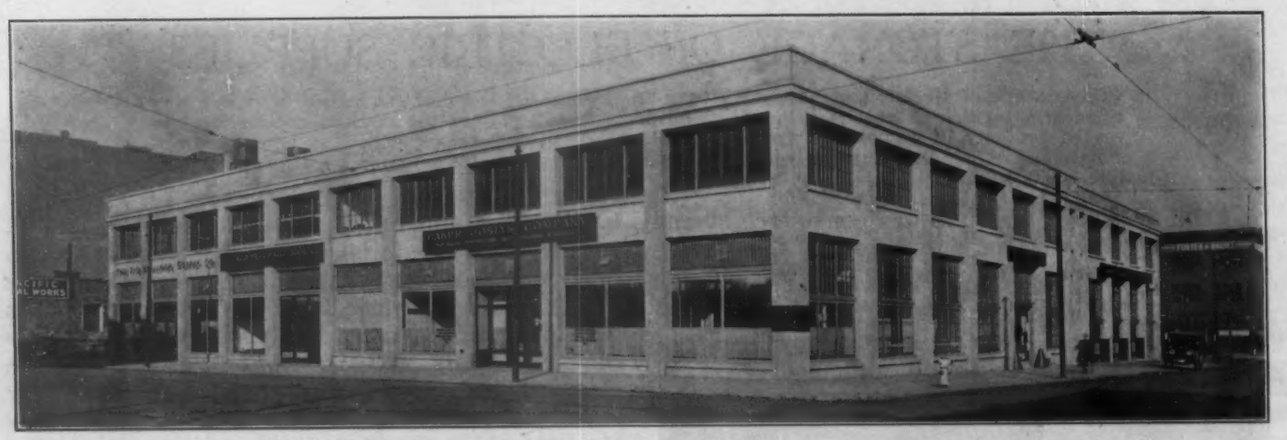
Directly behind the office is the main storage room, which receives light both from the glass front along Howard street and also from the front of the building through the glass partitions of the office. All very heavy materials are stacked on this floor in order of their size. There is no basement to the building and the whole theory of arrangement has been to avoid handling heavy materials any more than absolutely necessary. For this purpose the shipping and receiving department is centrally located here. A driveway for wagons slightly below the level of the floor permits the truck to be backed into the building, a great convenience in wet weather or when traffic is heavy on the street, as well as a saving in the handling of material. Directly to one side of this is the shipping office with a window where the drivers may receive their orders. The elevator and chute from the upper floors terminate

The main storage space is both well lighted and well arranged. The shipping department is centrally located and all material stacked with a view to convenience in handling.

just at the other side of the driveway, so that incoming or outgoing materials may be expeditiously handled. A large scale sunk into the floor is also convenient to hand for the weighing of the heavy supplies.

Materials are stacked or otherwise arranged in accordance with their shape in aisles, so that any may be reached and handled without disturbing the others. Barrels are stacked by laying boards between each layer on either side, forming a sort of track with a depression in the center on which the next layer is rolled. A barrel stacker which hoists the barrel to the proper height has proved a great convenience. It is operated by a crank and saves both time and effort. Heavy conduit, which is one of the most difficult materials to handle, is stacked on end between rests directly to one side of the shipping platform, so that it needs very little carrying. Washers and similar material are kept in bins with slanting shelves convenient to the scales.

The mezzanine floor is provided with shelving in alcoves for lighter materials. Although broken



In contrast to the basement storage room which is both inconvenient and poorly lighted, the walls of this office and warehouse are almost entirely of glass—and it is only on the darkest of days that artificial illumination need be used at all.

packages are not usually handled, occasionally in the case of unusual supplies such occur—and these are stored here. No broken packages are allowed on either of the main floors. Small package and light material such as V.V. Fittings, wood pins and brackets are stored here. When the installation is complete a placard which will be legible from the floor below will be attached at the end of each alcove and will give the bin number and contents for convenience in locating. A portable light with a wire guard is provided between shelvings. Materials of especial value such as spools of magnet wire are kept in a room specially provided on this mezzanine floor under lock and key. The room faces the street and is also provided with interior windows of heavy wire grating, however, so that it is both light and well aired.

The top floor is not subdivided in any way and presents a large expanse of floor space for storage. The entire two sides of this room are glass and skylights are arranged in the farther corner so that the illumination is almost perfect. The reels of wire are arranged at either end of the room with free aisles running the length of the building, so as to give measuring space down the floor. Coils are stacked horizontally or stood vertically between two boards laid along the floor like tracks, with occasional uprights against which to test the rolls. Barrels of glass and porcelain insulators are stored here, being material which is compact and readily transported. Although all the material is heavy it is easily handled and may be sent to the first floor by way of the chute.

The elevator is an extra heavy freight elevator of two-ton minimum capacity, with a combination of electric and hydraulic operation. It may be operated from any floor and is provided with all safety devices. The chute may also be used from both second and mezzanine floors and is guarded at each opening by safety rails to prevent accidents.

An adequate system of lighting, operated by pull chains, is provided throughout the building in addition to the daylight illumination, so that operations may be carried on after daylight hours with perfect safety and convenience. The whole effect of the building is one of neatness and of practical service in the expeditious handling of varied supplies.

Western Ideas

CHECKING UP ADVERTISING RESULTS proved to the Southern California Electric Company of Los Angeles that one of the most inexpensive mediums of advertising was the most effective. It was their own windows, according to J. Rendler, president of the company, as quoted in Contact.

"Every time we put in a real live window we tallied in a jump in sales. Having proved this to our satisfaction we concentrated on live windows, collecting good ideas from everywhere."

As to frequency of changing window displays, Mr. Rendler's study has given him decided ideas.

"The secret of attracting a crowd, according to what we have learned," he says, "lies in frequent changes in our windows. We rearrange the apparatus in the window every week without fail, and every two weeks we change the entire layout. Practically everyone who passes our windows has gone by at least once in that time, and must be presented with a new scene if his attention is to be held.

"When we plan a new window we aim high. We try to inject life into it, either in color or in action."

The success of the Southern Electric Company's displays has been so great that a number of smaller electrical dealers make regular bi-weekly trips to look at them and get new ideas.

When to show prices in the window and when not, is a subject that this company has worked out by trial.

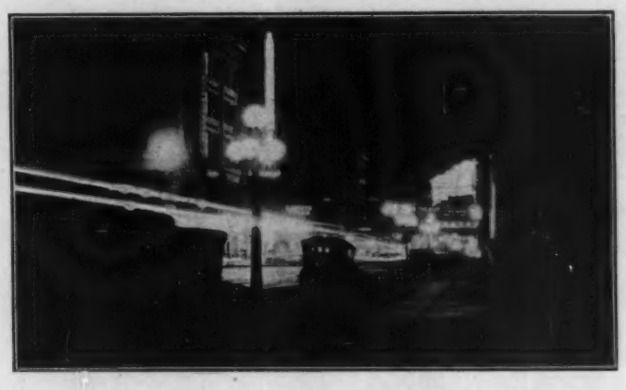
"We have a steadfast rule," they say, "never under any circumstances to advertise the price of expensive apparatus. We never put a price tag in the windows for more than $10.00. People have an idea that electrical appliances are expensive, and our aim is to gradually overcome this notion."

"When we are making a special drive on some particular piece of apparatus, an iron or a toaster-stove, we price that article in the window and nothing else. This focuses attention on these articles and has led many customers into the store.

"After all, our main object is to get customers into the store. Our salesmen are trained to do the rest."

LIGHTING UP for the boys who come home, is the latest recommendation of the Society for Electrical Development to merchants generally—and particularly to the electrical industry who will find a good business in supplying the electricity, the signs and the lamps for the patriotic displays.

Some idea of the magnitude to which the plan of welcoming the boys home electrically is being carried can be had from the facts regarding the



One feature of the patriotic illumination on Portland's "Broadway"

equipment that is being installed for the New York Times Building, and which consists of over 5,000 10-watt lamps distributed as follows: The entire building will be outlined with 300 two-foot stars, each star containing eleven lamps, alternating red, white and blue on a flasher. On the 43rd Street side, facing Times Square, will be a cluster of Allied flags, surmounted by a spread eagle holding the American shield. This display utilizes 1000 lamps and will measure 40 ft. wide by 24 ft. high. The flags will have a waving effect, and over this will be an electric sign reading "VICTORY," in six-foot letters. At each of the four entrances of the building will be a pair of crossed American flags waving, these will contain 250 lights each. And on the roof will be four flashlights illuminating the American flag flying from the flag staff.

The movement is not confined to New York, however, but is nation wide. The American flag shown here flashes nightly on the main street of Portland, Oregon, and is just one of thousands of such patriotic emblems to be found throughout the country. Every city and town which has boys to welcome home—and what town has not?—has the incentive to decorate for their home-coming. The opportunity open to the electrical industry to make these decorations electrical is obvious.

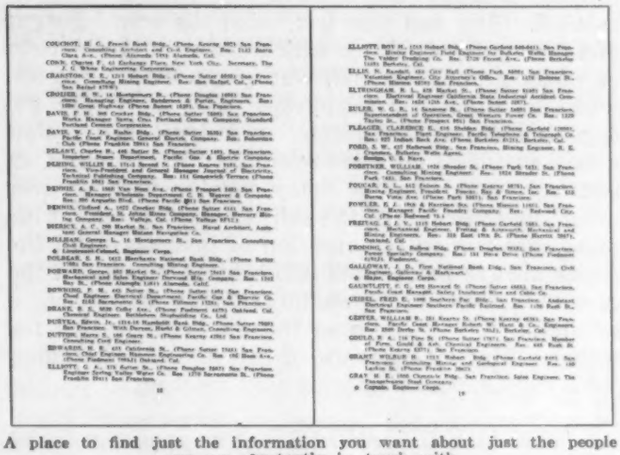
A BARGAIN AT $12.50 was advertised by an eastern power company to extend its housewiring campaign. The Elmira Water, Light and Railroad Company of Elmira, N. Y., through its commercial department, recently hit upon this plan for interesting the house owner.

"Any five-room home wired complete for electricity with service connection and lights for $12.50" was the slogan of the campaign. This, of course, was the "leader" and it was the salesman's duty to inform his prospect that the $12.50 five-room offer included open wiring—wires strung along the ceiling frequently seen in offices and some apartment houses instead of concealed between the walls—and that light was provided by a hanging bulb. As a matter of fact, such an offer showed a small loss to the company on each contract.

The campaign was profitable, however, as comparatively few of the prospects took advantage of the offer, most of them preferring more costly installations.

Every house-owner interested was interviewed personally with the result that 4000 contracts were secured out of which number only 15 signed for the original $12.50 five-room job.

THE NAME AND ADDRESS of the person you want to get in touch with is often a very elusive thing. You may want to reach a business acquaintance out of office hours—or locate a man whose telephone is listed under the name of his firm. For this reason the little handbook recently gotten out for the

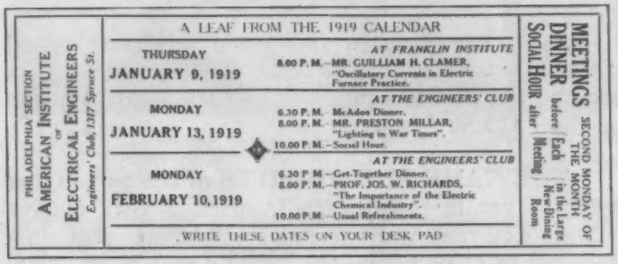


A place to find just the information you want about just the people you are constantly in touch with

Engineers' Club of San Francisco is a particular convenience. The book contains the constitution and by-laws and committee lists as well as the list of members, but its main purpose, of course, is to present this latter in convenient form. The membership is divided roughly into resident and non-resident groups and members in the service are marked by a star and their rank noted in addition to giving their local address. The information given comprises: name, business address, business telephone, occupation, home address and telephone. The convenience of having this data at hand can readily be recognized —and suggests a similar compilation of the membership of electrical organizations. Particularly in the case of contractor-dealers' associations, where the telephones of members are generally listed under the name of the firm, some printed slip which would give initials, business, home address and telephones would prove invaluable—and an additional link in the working together of the organization.

THE USE OF THE BLOTTER as an advertising medium has been taken advantage of by ink dealers and employment bureaus, but its use by a

society to advertise its meetings is something of a new application. This means of calling members' attention to meetings has been initiated by R. B. Mateer, well known to electrical men of the West through his work here some years ago, who is now chairman of the publicity committee of the Philadelphia Section of the A. I. E. E. Blotter advertising has the advantage of keeping the reminder always at hand and bringing the matter every so often


PHILADELPHIA SECTION
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
Engineers' Club, 1317 Spruce St.

A LEAF FROM THE 1919 CALENDAR

THURSDAY JANUARY 9, 1919 — AT FRANKLIN INSTITUTE
8.00 P. M.—MR. GUILLIAM H. CLAMER, "Oscillatory Currents in Electric Furnace Practice."

MONDAY JANUARY 13, 1919 — AT THE ENGINEERS' CLUB
6.30 P. M. McAdoo Dinner.
8.00 P. M.—MR. PRESTON MILLAR, "Lighting in War Times".
10.00 P. M.—Social Hour.

MONDAY FEBRUARY 10, 1919 — AT THE ENGINEERS' CLUB
6.30 P. M.—Get-Together Dinner.
8.00 P. M.—PROF. JOS. W. RICHARDS, "The Importance of the Electric Chemical Industry".
10.00 P. M.—Usual Refreshments.

WRITE THESE DATES ON YOUR DESK PAD

MEETINGS SECOND MONDAY OF THE MONTH DINNER before Each Meeting in the Large New Dining Room SOCIAL HOUR after Meeting

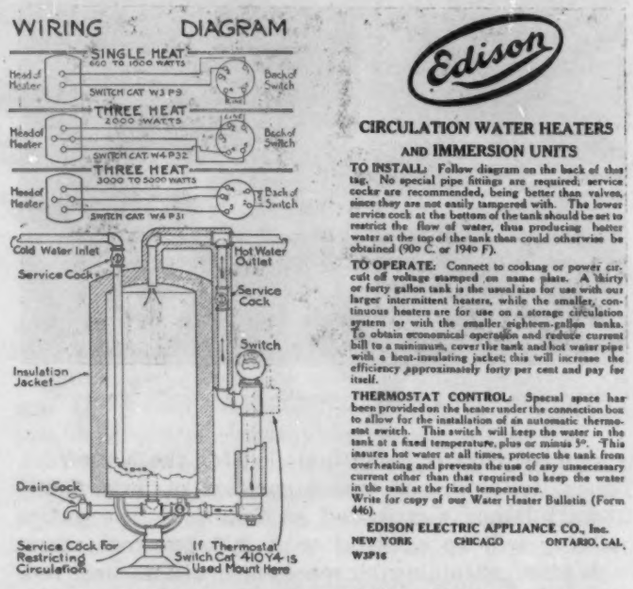
An announcement which will be seen

directly beneath the eyes of the person to be reminded. Any one who has noted the scroll designs and triangular curlicues which decorate the blotters of many a business man who plays with his pencil while he thinks or telephones, will appreciate the opportunities of the blotter. It is true enough that a man may rub his hand over the advertising of an insurance company for many months without ever becoming conscious of the subject matter, but let his mind once run on the question of insurance and the notice always before him will catch his eye. In the case of a meeting of which the man is wanting a reminder, it will serve as the pin-prick needed for action. Why not make use of this in place of sending out a card announcing your next meeting?

THE ADVERTISED USE of an appliance is not always the only one it may be used for. The electric heater may be used as a hair dryer, the disc stove as an iron for handkerchiefs and small articles as well as its normal use, the electric iron is a temporary bed warmer. As for the vacuum cleaner, it may be used to follow the lawn mower and pick up loose grass—or as recently reported by a salesman of the Pacific States Electric Company, as a blower on an oil burner in the town of Livermore. A Thor washing machine was also located by this company in the home of a walnut grower in Southern California who used the machine to wash clothes on Monday and to wash his entire crop of English walnuts on other days. The X-ray Reflector people have found a new use for floodlights as discovered by Hobrecht & Company of Los Angeles. The farmers of this region have ordered floodlighting projectors for lighting rice fields to keep the duck and geese away at night.

The moral, of course, is that there are more ways than one to sell an electric percolator—or of meeting the needs of a customer, however strange.

PREPARING FOR TROUBLE is like carrying an umbrella on a threatening day — it generally doesn't rain, but if it does the umbrella is mighty convenient to have along. The tag here illustrated is an example of how trouble is avoided by the Edison Electric Appliance Company, Inc., by answering before hand all the questions which are likely to come up. The tag is one designed for circulation water heaters and immersion units and is attached to each of these instruments before it leaves the factory. On one side is a complete diagram of the installation, showing just how the instrument should


WIRING DIAGRAM
SINGLE HEAT
600 TO 1000 WATTS
Head of Heater
Back of Switch
SWITCH CAT. W3 P9
THREE HEAT
2000 WATTS
SWITCH CAT. W4 P32
THREE HEAT
3000 TO 5000 WATTS
SWITCH CAT. W4 P31
Cold Water Inlet
Hot Water Outlet
Service Cock
Switch
Insulation Jacket
Drain Cock
Service Cock For Restricting Circulation
If Thermostat Switch Cat 4104-15 Is Used Mount Here
Edison
CIRCULATION WATER HEATERS AND IMMERSION UNITS
TO INSTALL: Follow diagram on the back of this tag. No special pipe fittings are required; service cocks are recommended, being better than valves, since they are not easily tampered with. The lower service cock at the bottom of the tank should be set to restrict the flow of water, thus producing hotter water at the top of the tank than could otherwise be obtained (90° C. or 194° F).
TO OPERATE: Connect to cooking or power circuit of voltage stamped on name plate. A thirty or forty gallon tank is the usual size for use with our larger intermittent heaters, while the smaller, continuous heaters are for use on a storage circulation system or with the smaller eighteen-gallon tanks. To obtain economical operation and reduce current bill to a minimum, cover the tank and hot water pipe with a heat-insulating jacket; this will increase the efficiency approximately forty per cent and pay for itself.
THERMOSTAT CONTROL: Special space has been provided on the heater under the connection box to allow for the installation of an automatic thermostat switch. This switch will keep the water in the tank at a fixed temperature, plus or minus 5°. This insures hot water at all times, protects the tank from overheating and prevents the use of any unnecessary current other than that required to keep the water in the tank at the fixed temperature.
Write for copy of our Water Heater Bulletin (Form 446).
EDISON ELECTRIC APPLIANCE CO., Inc.
NEW YORK CHICAGO ONTARIO, CAL.
W3P16

The front and back side of the tag which is attached to every water heater before it leaves the factory

be connected and how it will look set up and the details of the wiring for the three types of apparatus. The other side gives full directions as to how to install and how to operate, with special directions on the thermostat control. This tag is supposed not to be thrown away but to be kept for convenient reference should any question arise at a later date. A suggestion is made at the bottom that the special bulletin on this subject be sent for.

FOURTEEN RULES FOR ELECTRICAL CONTRACTING PRACTICE

The following Code of Practice is recommended to architects, consulting engineers, contractors and owners as well as owners' engineers, by the National Association of Electrical Contractors and Dealers, the Executive Committee of which adopted and approved it as a step toward the standardization of many practices in connection with the original contracts and those for extras which, unless definitely settled in advance, leads to misunderstanding on both sides and frequently to controversies and litigation. The National Association does not, however, attempt to bind its members to use this code, but respectfully submits same for the approval of both customers and contractors.

Rule IX. Unless specifically provided for in the contract, an extra charge will be made for any special finish or variation from the standard materials. By "standard materials" is meant standard material as regularly listed by the manufacturer whose product is specified.

THE CONVENIENCE OUTLET QUESTION

(Of course every householder should be liberally supplied with convenience outlets—but they are not. Old houses sometimes present difficulties of a mechanical nature—and new houses need greater cooperation between contractor and architect. The problem was discussed from its various angles at a recent meeting of the San Francisco Electrical Development League, from which two papers are here presented.—The Editor.)

HOUSEWIRING FROM THE MANUFACTURER'S STANDPOINT

BY E. N. BROWN

In a letter that I recently received from the Heating Appliance section of the Associated Manufacturers of Electrical Supplies they stated that the war had advanced the electrical business at least 20 years. If this statement be true and we do not get a hustle on ourselves we are going to be 20 years behind before we know it.

There were $10,000,000 worth of heating appliances sold in the year 1918, and in actual volume the production of 1918 was in the neighborhood of twice the production of 1914. This demonstrates the fact that it is necessary for us to take measures for house wiring, not only to meet the advancement up to the present date but that of the future. I am frank to state that in this connection I believe the matter lies almost wholly in the hands of the architects, builders, electrical contractors and power companies.

I think it very commendable on the part of the Chief of the Department of Electricity to wish to take up the matter of house wiring at this time at a meeting such as this, where it comes before those so vitally interested.

I am only a manufacturer and can only offer a few suggestions: I think the wire to the wall outlet should be handled by those I have previously mentioned and I do not want to make any suggestions on that end of it, as those branches mentioned should be fully capable of handling the situation, but I would suggest that the wire from the wall outlet to socket fixture should be increased to No. 14 as a minimum, and I also think that the fixture should have plug outlets independent of light outlets — this is now being practiced universally in New Zealand and in such a manner that it has proved entirely satisfactory over there. I received this information from our New Zealand agents.

I also think that each room should have a base board receptacle,—I think this should include the kitchen as well as other rooms, as we have to figure on electrical ranges in the future, and where they are used we will want to use air heaters for warmth or fans for cooling, as the case may be, in addition to irons, etc.

I understand the object of this meeting is for a discussion of how to prevent fire hazard as well as discussing house wiring, and if I am correct I want to suggest two matters so they may come before your notice. The first is that there are a great many clerks in stores who are order takers and not salesmen. These clerks oftentimes make errors that should not be made and for which the public blame the electrical business in general. I think this can be partially overcome by the good work the California Electrical Cooperative Campaign managers are now doing. Educate the clerk and let him help educate the public.

Secondly, I wish to call before your notice the fact that a great many devices are being placed on the market that seem to be manufactured for cheapness, and these devices have caused trouble and will cause trouble as long as the main object of the manufacturer is to see how cheap he can make an article for the trade. The dealer can overcome this matter to a great extent by buying quality goods. There are also a great many articles on the market that are not approved by the underwriters, and which should be approved before being marketed. If the dealers would only take the trouble to find out if these articles are approved by the underwriters they would help the electrical business a great deal. I think in this connection that the fault lies mostly with the dealer, as the manufacturer would certainly be forced to put out an article which was approved by the underwriters if the dealers demanded it. In all these matters any company stands only too willing to cooperate and assist in any way it is called upon, both with its advertising and its engineering force.

THE BASE RECEPTACLE AND THE CONTRACTOR-DEALER

BY W. D. KOHLWEY

The electrical dealer is greatly interested in the sale of appliances (and I am going to leave out the word "lamp socket appliances," for reasons that will follow in proper routine). The sale of appliances swells the daily receipts, and the total of these receipts really classifies the dealer.

Our slogan to buy electric appliances from the electrical dealer has a real and sincere purpose back of it; we want to see these appliances used under the most favorable conditions so that the users can get the very best results with the least effort—for the satisfied customer is the real asset of any business. The electrical business with us is not a side line as it is with the department, hardware, and drug store. With them, if the appliance does not give satisfaction, gas, coal oil, or alcohol is recommended, and things electrical are given another setback.

Unfortunately, about 90% of appliances are not used under favorable conditions—connections are makeshifts, floor and base board plugs are missing. Of course we know why they are missing. The campaign of the Society for Electrical Development for the extra outlet was one of the best things ever done by them. We need that extra outlet—and then some more—for the toaster, the iron, the vacuum cleaner, the piano lamp — and moreover, let's not forget the heater. Now, if we can get the order to install these plugs, can we do so and stay within

the rules of the Department of Electricity? Seldom, for as a rule houses are wired for lighting only and the service is not heavy enough. Oftentimes a larger wire could be pulled in, but again we are up against the proper sizes of conduit. To put in an entire new service would entail too great expense—so the work is left undone and appliances are used under adverse conditions and under greater hazards. However, the Department often grants special permission in cases where an installation can be improved by not following altogether the very word of the rules and code. How far the Department will go, of course, I don't know—there are so many shoemakers and locksmiths in the electrical business that it isn't wise to grant too great a leeway.

APPLICATIONS OF ELECTROPLATING

Electroplating is an art which has been developed during the last 50 years with only occasional applications of scientific principles. Formerly the industry was much shrouded in mystery, each plater guarding jealously the formulas and methods employed by him. Of recent years, however, there has been a considerable demand from electroplaters and manufacturers for more exact data relating to this industry.

This need and demand for information has been emphasized during the war by the numerous problems that have arisen in connection with the plating of military supplies of the most varied description. Thus, zinc plating has furnished an excellent and, in many cases, the best protection against the corrosion of steel parts, such as airplane and seaplane fittings, fuse parts, hardware on ammunition boxes, etc. Black nickel plating was very extensively used for producing the so-called "government bronze" finish upon brass hardware and saddlery equipment. Lead plating proved valuable in the lining of gas shells and for bringing up to standard weight shells which were under weight. In connection with these problems a number of investigations were conducted at the Bureau of Standards, whose experts made frequent visits to munition plants to advise upon the best methods of securing the desired results.

Appropriations have been requested by the Department of Commerce to permit more exhaustive study by the Bureau of Standards of plating problems and their application to various manufacturing industries. Electroplating forms an excellent illustration of a "key industry," i. e., an industry which, while it is not itself of great magnitude, is often of fundamental importance to larger industries. Thus, electroplating is essential to the manufacture of tools, builders' and saddlery hardware, plumbers' supplies, gas and electrical appliances, automobiles, silverware, jewelry, stoves, household utensils, mechanical devices such as phonographs, cash registers, sewing machines, adding machines, typewriters, cameras and other optical and scientific instruments, and, in fact, almost every industry in which finished metal articles of any description are produced. Progress in the art of electroplating will bring about corresponding improvements in all such industries.

BRINGING THE SAFETY MESSAGE HOME

A little informality in the Safety Bulletin is more likely to make it remembered. The accompanying picture is a reduction from a poster issued by the Northern Pacific District, United States Shipping Board, in their campaign for accident prevention. As reported by the California Safety News, there is now about one accident to every three men employed in shipyards. By effective methods of prevention this may be reduced to a fair average of one to every eight men employed. The poster, which really carries its point, is one means of achieving this end. The Gary Works of the Illinois Steel Company has hit upon a similar scheme in connection with its works. It was noted that the Safety bulletin boards were failing to attract attention and so pictures were combined with chalk sketches and comments.

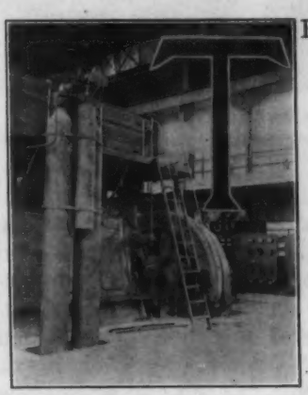
Various posters were secured illustrating patriotic subjects, matters of public interest and advantages of safety. These posters were arranged on boards with some catchy phrase printed with chalk. This plan proved its value by the renewed interest taken in the material posted.

Panorama of mine, showing the filter building at the extreme left, the settling tanks, mill building, main ore bin, main warehouse and power house, with the Mexican and white man's villages in separate localities as indicated.

ELECTRIC GENERATION BY DIESEL ENGINE

BY E. J. RICHARDS

(There has been much talk of the use of the Diesel engine to generate electricity for use in mines—but up to now no actual application in the West. This description of the successful generation of electricity by Diesel engine for the operation of a large copper mine in Arizona will therefore prove of particular interest. The author was formerly chief electrical engineer of the Arizona Hercules Copper Company and had entire charge of this installation and its early operation.—The Editor.)



Interior of the power house, showing the enormous bottles for compressed air used for "cranking up" the Diesel engines.

THE property of the Hercules Copper Company is situated in Pinal county, Arizona. It is a copper producing property with its mines located at Ray and its concentration mill and power plant located six miles distant at the town of Kelvin. The reason for this separation is the availability of water at Kelvin, located on the Gila river, needed in the milling process, and a suitable topographical location for the disposal of "tailings" or waste material resulting from the milling process.

Steam vs. Diesel Engine

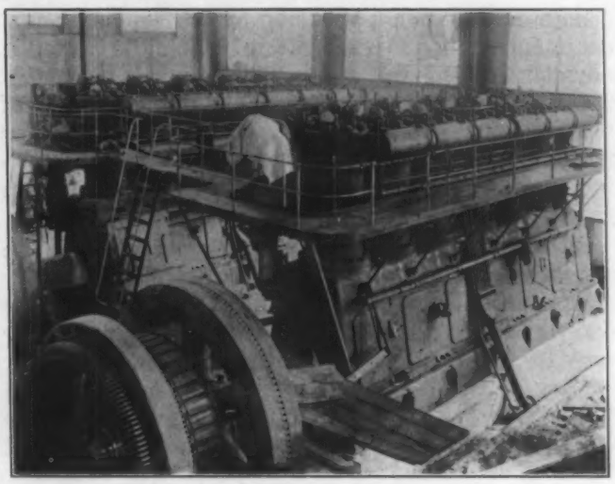
During the early days of the developmnt of this property very careful and serious consideration was given to the question of power supply. Electrical distribution was determined upon early in the investigation and the relative merits of steam vs. Diesel engines were carefully analyzed, due weight being given to the matter of coal supply, price and quality, as against fuel oil from the Southern California oil fields.

After an extended study of all the factors entering into this particular situation, Diesel engines were decided upon and an inspection of various Diesel engine plants operating in the Southwest led to the adoption of the engine manufactured by the McIntosh and Seymour Corporation. It was felt that this engine possessed superior features for this work and was manufactured in sizes best suited to the probable load conditions to be expected in the operation of this mine.

Details of Installation

The power house was designed and foundations provided for four units of a nominal rating of 1045 h.p. each, three units being installed as an initial equipment. The engines are of the six cylinder, four cycle type with cylinder dimensions of 22 inches diameter by 32 inches stroke at 164 revolutions, each unit occupying a floor space of approximately 46 feet by 14 feet, with a maximum height of 17 feet above the floor line. The total weight of each unit complete is approximately 42,500 pounds.

The guaranteed fuel consumption of these engines was .67 pounds per kw-hr. at the switchboard on fuel oil of a heating value of 18,500 B.t.u. As a matter of fact, this guarantee was materially bettered on a preliminary test run using 14 gravity oil from the Bakersfield oil fields.



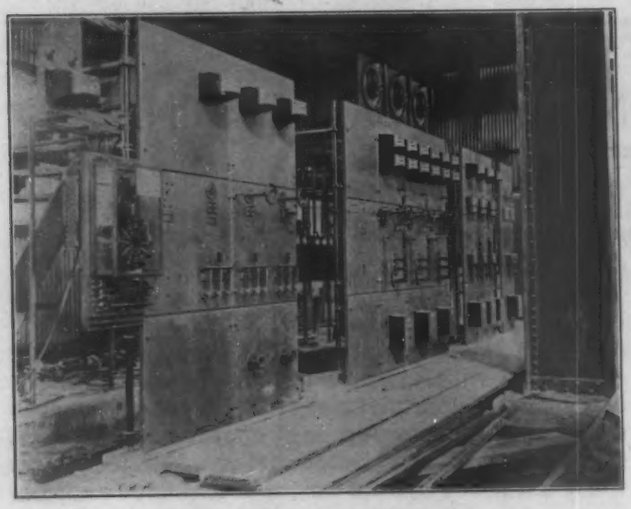
POWER PLANT INTERIOR

The Diesel engines installed.—The power house provides foundations for four units of 1045 h.p. each, three units being installed as an initial equipment.

Each engine unit is directly connected to a 900 kva., 3 phase, 60 cycle, 2300 volt generator with 125 volt overhung exciter on the end of the main engine shaft. A suitable standard switchboard is provided, in a switchboard bay, consisting of four generator panels, a Tirrell regulator panel, a transmission line panel, two mill feeder panels and one pump line panel for a line to the pumping plant at the river. The

transmission line panel supplies the primary side of three 500 kva. water cooled transformers, 2300/4400 volts—with one spare unit—supplying energy to the transmission line leading to the mine, six miles distant.

The power house building is a steel frame structure, size 60 by 120 feet, covered with corrugated iron with wood roof on steel trusses and covered with asbestos prepared roofing. The building is served with a 15 ton hand operated crane.



SWITCHBOARD PANELS

The power house switchboard of four generator panels. A Tirrell regulator panel, two mill feeder panels, and one each for the transmission line and pump line.

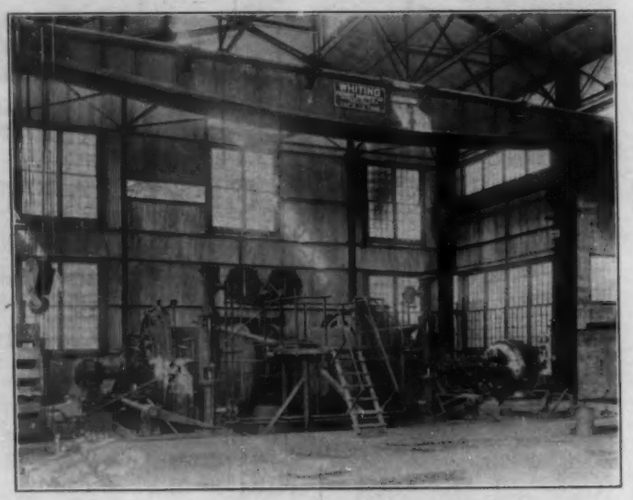
A 50,000 gallon steel tank located about 500 feet distant and at an elevation of about 50 feet above the power house floor furnishes a supply of cooling water for the jackets of the engine cylinders, with a concrete spray pond, about 50 by 50 feet and 6 feet deep, furnishing a reservoir in which the water is normally cooled by spray nozzles and circulated through the cooling system. A duplicate set of motor driven centrifugal pumps, located in the power house, circulates this water through the cooling system or returns it to the steel storage tank, as required.

Two 40,000 gallon steel oil storage tanks are provided and located about 500 feet from the power house at an elevation slightly below the power house floor but at such an elevation as to permit unloading tank cars, by gravity, from the main railroad spur leading to the mill. Oil is pumped to 500 gallon "daily" storage tanks above each engine, by means of electrically operated triplex plunger pumps located at the main storage tanks and operated by means of switches in the power house.

Transmission Line

The transmission line between the power house and mine is located along the east bank of Mineral Creek and runs in practically a direct line between the two termini, on private right of way. The poles are of expanded steel spaced about 15 to the mile with 13 anchor towers at selected points along the line. As the line traverses a mountainous country, composed almost entirely of rock, practically all holes had to be blasted, and the footings of all poles were set in concrete.

Owing to the rugged and inaccessible character of the country all material, including poles in sections, pins, insulators, cement, gravel and even water for mixing concrete had to be transported by burros to the site of each pole.



HOIST AND COMPRESSOR HOUSE

The motor which furnishes the power for operating the Nordberg hoist is shown at the right.

The main power conductors are 3/8 in. Siemens Martin seven strand steel cables, with a 5/16 in. similar steel cable above these as a ground wire and two 1/4 in. similar steel cables below the main conductors for private telephone service. Lighting protection is furnished by means of outdoor type horn gap arresters at each end of the line and air break switches on the terminal pole at each end of the line constitute the only switching arrangements on the high tension side of the line.

44,000 volt pin type porcelain insulators are used on all single piles with three disc insulators in series at each anchor tower.

Mine Equipment

The mine substation is located in what is known as the Compressor or Hoist House, a steel frame, corrugated iron covered structure, and includes three 500 kva. water cooled transformers, with one spare, similar in all respects to those at the power house. Taps are provided on all transformers for necessary adjustment of voltage. The secondary voltage at the substation is 2300 volts and nine switchboard panels give control of the various circuits at the mine, each panel being provided with an integrating wattmeter for recording the energy used in the various stages of the mining operations.

In the building housing the mine substation equipment is also located the main mine hoist, a double drum, counterbalanced hoist with a rope speed of 1000 feet per minute, directly driven by a 400 h.p. 2300 volt slip ring type induction motor with speed control furnished by means of a liquid rheostat. Here is also located a 3000 cu. ft. two stage air compressor driven by a 518 h.p. synchronous motor; two 100 kw. motor-generator sets for underground trol-

ley haulage and the necessary motor driven pumps for handling auxiliary cooling water supply for compressor and transformers and oil pumps for operating brakes, clutches, etc., on the main hoist.

Other motor drives at the mine include a 150 h.p. motor in the crusher plant driving a gyratory crusher and set of Traylor rolls; a 40 h.p. motor operating a 36 in. horizontal belt conveyor from the crushing plant to the main 5000 ton ore storage bin and the sample mill equipment; a 20 h.p. motor operating a horizontal belt conveyor over the ore storage bin; a 50 h.p. motor driving the machine tools, etc., in the machine and blacksmith shop, and a 10 h.p. motor driving a saw mill in the timber framing shed. All of these motors are located on the surface and all motors of 20 h.p. and over are wound for 2300 volts.

Underground on the first level, at a depth of approximately 500 feet, are located two 4 stage centrifugal pumps directly driven by 50 h.p. motors at 440 volts and used for pumping mine water to the surface. One unit is held as a spare. A similar pump but of larger capacity has been arranged for the second level, at approximately 1000 feet depth, driven by a 125 h.p. 440 volt motor.

The main underground haulage levels are served by an overhead trolley system in which 4-ton locomotives are arranged to handle trains of not to exceed 38 cu. ft. ore cars. These locomotives are each equipped with two 11 h.p. 125 volt d.c. motors with series-parallel control. The adoption of this low voltage is practically an innovation in the copper mining industry as it has been found that 220 volts has proven fatal to life under conditions found in copper mines. These 125 volt locomotives operate with entire success.

Mill Equipment

At the mill are located 3 Marcy mills each driven, by means of spur gearing, by a 225 h.p. slip ing variable speed motor. Three sets of horizontal belt conveyor, each driven by a 10 h.p. motor, handle the ore from the mill storage bin to the Marcy mills.

Three Harding mills for fine grinding are directly driven by 50 h.p. slip ring variable speed motors. Two pressure blowers for the flotation system are driven by 200 h.p. induction motors. A 60-ton electrically operated crane in the grinding room is supplied with direct current by a 75 kw. motor generator set. Three sets of pulp distributors together with pulp elevators for the flotation system are driven by three 20 h.p. motors. Overstrom tables are driven by a 40 h.p. motor.

The machine and blacksmith shop at the mill is operated by a 50 h.p. motor. Sundry tailings pumps, concentrate conveyors, etc., are driven by various small motors in sizes from 7½ to 10 h.p. As in the mine installation, all motors at the mill of 20 h.p. or over are wound for 2300 volts.

Energy for the mill installation is supplied from the power house over a line of steel pole construction carrying two bare stranded copper circuits of No. 4/0 wire with reserve space for additional circuits for future mill extensions.

The filter plant is operated by a 50 h.p. motor and in this plant are also located two centrifugal direct driven return water pumps each driven by a 25 h.p. motor.

Pumping Plant

At the mill pumping plant, located on the banks of the Gila river, are located two quintuplex plunger pumps, each driven by a 200 h.p. two speed motor; each pump having an approximate capacity of 500 or 1000 gallons per minute depending on its speed. The pumping plant is supplied with energy by a wooden pole line from the power house carrying a single circuit of No. 0 bare stranded copper wire.

The power house operations have been successful and the result of the first month's operations with an extremely low load factor and with full power house operating crew gave a resulting cost of approximately nine mills per kw-hr. at the switchboard, although this figure will be materially lowered when full load conditions are obtained.

HOW MANY ENGINEERS ARE THERE IN AMERICA?

In Prof. Charles R. Mann's report on engineering education it is stated that up to 1870 the total number of graduates of all the engineering schools in America was 866, and that there were only 7,274 practicing engineers in 1870. Up to 1915 the total number of engineering graduates was 55,000, but 39,999 of these graduated subsequent to 1880. Prof. Mann estimates that there are 80,000 men who could qualify for membership in the four great national engineering societies, and that about 40,000 are graduates. We regard the 80,000 as an underestimate, for the census of 1910 indicates that there were more than that number eight years ago. The 1910 census shows:

Mining engineers	14,514
Mining engineers	6,930
Civil engineers and surveyors	52,033
Electricians and electrical engineers	135,519
Draftsmen	33,314

Although many of the draftsmen and surveyors could not qualify as engineers, and although almost none of the "electricians" could so qualify, it seems evident that fully 100,000 men could have qualified as engineers in 1910.

The total number of engineers recorded in the census doubled between 1890 and 1900, and it more than doubled between 1900 and 1910. There is reason to believe that the increase during the past eight years has been fully 50 per cent, for in the 10 years of 1901-1910 the engineering graduates numbered 21,000 as compared with 17,000 in the six years of 1911-1915.

It is the belief of Engineering and Contracting from which the brief survey here given is quoted, that there are now fully 150,000 Americans who can qualify as engineers. The total membership in all the societies having headquarters in the Engineering Societies building in New York is 53,000, of whom about 30,000 are members of the four great national engineering socities.

UNIFORM FILING SYSTEM

BY C. C. HOGAN

(A unique system of filing which has been adapted from the Dewey decimal system to meet the particular needs of a large power company. The data is of interest to anyone handling electrical and engineering subject matter of any kind from a company library of books and pamphlets to correspondence. The actual subjects and subdivisions in use by the Southern Sierras Power Company will be given in the next issue of the Journal of Electricity.—The Editor.)

In common with all other public service corporations, the need of a satisfactory system of filing has been one of the problems incidental to our development and growth. The problem has existed for years, but has never been completely solved.

Shortly after our entrance into the Southern California territory and the removal of our operating headquarters to Los Angeles, it was apparent that our business and operations were to assume large proportions,—that there would be a variety of businesses managed from our California headquarters in addition to the primary industry of generating and distributing electricity. Thus we soon found ourselves engaged in the manufacture of ice, in the operation of a telephone and telegraph system, a railroad and a water and irrigation system. Incidental to such multitudinous and varied operations, and the incorporation, acquirement and financing of the several companies as the mediums through which they must needs be conducted, there necessarily developed an enormous correspondence, much of which is of vital importance from a legal and an historical standpoint. The preservation of these records in such a manner as to render them readily available was a problem which presented great difficulties for several reasons, a few of which I will state.

Familiar Filing Systems Unsatisfactory

First, the bulk of the correspondence was between a limited group of people, viz.: our officers and directors, department heads and superintendents; with the exception of letters to and from our bankers, government officials and customers (in the aggregate a small percentage of the whole), practically all of our correspondence is inter-office or inter-departmental. Consequently, the ordinary alphabetic system would not suffice. For instance, correspondence with our secretary, Mr. Fisher, if filed alphabetically under "F" would soon accumulate into a mass of miscellaneous and unclassified papers that would render the location of particular documents difficult if not impossible. This objection to the alphabetic systems applies to, I should judge, 90% of our files.

Second, it was not possible to file geographically, that is, by office or stations, for the same reason. If all correspondence with the El Centro office, for example, was filed under El Centro, it would soon resemble a paper factory hit by a German shell.

Third, the use of the ordinary numerical system by which subjects are numbered and indexed in numerical sequence as they arise, while perhaps containing many advantages over the alphabetic or geographic system, nevertheless presented these objections: The duplication of subjects could not be avoided, as the same subjects would be designated by different names, so that the index would not disclose a possible duplication; and, the keeping up of an elaborate index would, in itself, require labor and expertness that could not be expected of the ever-changing force of clerks employed to do this work.

The Dewey Decimal System

Having eliminated the Alphabetic, Geographic and Numerical-Subject Index system of filing, we did not thereby conjure away the pressing problem before us. Our business was growing, our papers were accumulating and must be classified and filed in some way. After considerable discussion the suggestion floated in from somewhere to try the Dewey Decimal System. But while the Dewey Decimal System of numbering subjects was the ideal one for subdividing, there was apparently no classification or compilation of subjects which covered our particular line of business. The original Dewey Decimal System was applied to library work, and is still the basis of the Standard Library Classification. The Bell Telephone System also had worked out a telephone subject classification, and a Mr. Williams had compiled a railroad classification on the decimal plan. About the time I tackled the job or shortly thereafter the Journal of Electricity, I believe, did publish in full a classification designed for the Electric Light and Power business, but a careful study of all classifications then available disclosed the fact that they were either not applicable to our business as a whole, or else were rather loosely thrown together without an orderly and uniform segregation of subjects.

I became thoroughly convinced that the decimal system of numbering was superior to any other arrangement, for two main reasons, i. e., it permitted of designating subjects by definite numbers which could be forever retained in a fixed relation to all other subjects, and it provided a means of unlimited subdivisions without destroying the fixed relation of the primary subjects. It follows that when a subject was once predetermined its name and number would always remain the same, and the repeated use of the subject, name and number would add immensely to its mnemonic value and avoid any possibility of useless duplications.

The problem then was to build up a full-fleshed, red-blooded subject body upon the decimal-numerical skeleton, and this for a time was a poser, for no serious attempt had theretofore been made to designate our correspondence by subjects.

My task was, first, to collect and compile a list of every conceivable subject with which we were likely to deal; second, to group such subjects in uniform and orderly relation to each other.

Collection and Classification of Subjects

To accomplish the first task, that of collecting subject names, I had access to all the companies' files since we commenced business; current correspondence was carefully analyzed and a circular letter

was sent to all department heads and superintendents, requesting them to submit lists of subjects with which they dealt. No attempt was made to suggest names for their subjects, as it was thought that whatever names they might hit upon would perhaps indicate the terms more commonly used. About six months was required to collect, analyze and list the subjects. This called for careful work to avoid duplications and to determine upon subject names that would correspond to subject-matter.

After the list of subjects was compiled in this manner, the second task, that of segregation, was undertaken, and of the two, this was by far the most important. It is easy enough to scramble eggs, but not so easy to reverse the operation. The difficulty of arranging an orderly segregation of the subjects is illustrated by the fact that our present classification is the result of four revisions in the arrangement of primary subjects.

First, I wanted the complete classification to be a reflection of our business,—so that by reference to it we would there find reproduced by appropriate name, every act or thing which goes to make up our system and business. I pondered upon this deep and long, for to make my automaton function and serve —to make the classification workable and useful, was a "consummation devoutly to be wished." In arranging the position of my subjects, it occurred to me to follow in logical sequence our own business growth. If the Classification was to be a true, undistorted reflection of our business, why not begin at the beginning, that is, the organization and incorporation of our companies, and then arrange the subjects representing our various stages of development in their logical sequence?

This, in short, is the groundwork plan of the classification, for eliminating the "General" Division, the main Divisions follow our development in regular sequence, Administration (including organization-incorporation), Engineering (Construction), Operating, Finance & Accounts, Properties, Public Service. It is intended to comprehend every activity connected with our business from the time it is organized until it is a "going concern." Between those two extremes is found a suitable place for every subject which may arise.

Original Features

An original feature of our system, to be found, I believe, in no other Classification, is that a definite function or scope is assigned to each Division. Administration, as the word itself signifies, comprehends in addition to organization, all managerial functions—the division and exercise of authority from the stockholders down to the humblest employes.

Likewise, the next Division—Engineering, embraces definite functions—Surveying, Construction, Maintenance, Dismantling.

So on, down through the remaining divisions, definite duties are assigned to each. These are readily distinguishable in practice, and easily memorized so that in filing or locating correspondence, by a rapid mental process of elimination the subject is readily narrowed down to its proper Division.

The advantages of this arrangement are very pronounced in practice, but difficult to put into words. The subject names appearing in the Divisions of Engineering, Operating and Properties, consist for the most part of things, or nouns; the functions assigned to the Divisions indicate what is done with the nouns—in short, supply a verb. The effect of this is that by placing a subject or thing in either Division it becomes clothed with the virtues of that Division—in other words, the particular activity concerning the subject is indicated. For instance, the subject of Water Wheels, if 231.310 in Engineering Division would mean that anything concerning the construction, repair or dismantling of a water wheel would be so numbered. If in 331.310, Operating Division, it would concern the operation of the apparatus; if in 531.310, it would concern the Purchase, Rental or Sale of a Water Wheel. By this automatic combination of nouns and verbs we avoid unnecessary duplication of subjects. In the instance cited, under the ordinary method a separate subject would have to be given:

Construction of Water Wheels
Repairs to Water Wheels
Dismantling of Water Wheels
Operation of Water Wheels
Purchase of Water Wheels
Rental of Water Wheels
Sale of Water Wheels

At least seven separate subjects, whereas our plan requires but three.

The Principle of Subdivision

It was then in order to fill in the intervening spaces—to give substance and contour to the body that it may be both pleasing to the eye and useful in service. To build up a classification from the materials at hand that would comprehend every class of business involved and every phase of each class.

It will be noticed that the seven main Divisions were assigned the hundreds series. The next subdivision is, of course, the tens. With few exceptions, which it is unnecessary to here explain, each of the tens was assigned a class or kind of business in which we are engaged, such as 30. Electric, 40. Railway, 50. Gas, 70. Heating, 80. Water. (A complete classification for Gas and Heating is compiled and given its place ready for use later on should we perchance engage in this kind of business.)

Another unique and original feature of the classification is the uniformity observed in assigning identical sub-numbers to the different classes of business in each of the main divisions. This is a great aid to memory, for once the sub-number is memorized, you can confidently locate it in any appropriate main division by using the proper "Hundred." The subject "Substations" (37.) is 237. in Engineering, 337. in Operating, 537. in Properties. This uniformity in numbering is maintained throughout the entire classification, and has proven to be an invaluable aid in actual practice.

Having segregated our business, first, into seven main divisions or groups, second, into the various classes of business, it remained to then combine within each class all the subjects pertaining thereto. Each class, except in general matters affecting all

alike, stands on its own bottom and is complete in itself. Each organ of our imaginary man performs its proper function and occupies its predetermined place.

It is unnecessary to go further in explanation of the subject grouping, for it will be obvious, having followed me thus far, that minor subjects pertaining to each class are simply sub-divisions of that class, the appending of the required number of decimal figures being resorted to to designate each minor subject by a fixed number so that its position in the classification never changes.

I may say, however, that in arranging the minor subjects, the same method was followed in grouping them in their regular and logical sequence. For instance, in the Electric group, we started at our Generating Plants, then placed Transmission Lines, Distribution Lines, Sub-Stations, and Customers' Installations, each in regular order. This same treatment of minor subjects is followed throughout all Divisions of the Classification, so that in locating a subject the habit is soon acquired of finding it where it naturally belongs with relation to other subjects.

Self-Indexing Card System

The third original feature and the one most important and useful in practice, is the self-indexing card system worked out for the complete classification. The self-indexing feature is followed out to some extent by the use of tabs in the condensed Classification Booklet for the use of local offices. This scheme of self-indexing does away entirely with the elaborate alphabetic index to subjects commonly used with the decimal system, and permits of the almost instantaneous location of a given subject.

Can Be Combined with Other Systems

I desire also to point out that notwithstanding all subjects are given a definite and permanent number, this does not prevent an alphabetic, geographic or other special sub-division of those subjects when circumstances require. This is a purely mechanical arrangement in no way detracting from the original principle of our filing system. It makes possible a combination of the numerical, alphabetic and geographic systems. For instance, if the subject 638., Irrigation Service, becomes too bulky, an A-Z Folder for alphabetic sub-division is used for this subject so that correspondence concerning each customer can be filed alphabetically but will always, by the governing number 638., be kept in its proper position in the files.

SAFETY FIRST

BY C. R. HILL

(The recent agitation of the safety question in the West with a view to legislation along these lines has made the following statistics of special interest. The data formed part of a paper presented before the Nevada Section of the N. E. L. A. The author is with the University of Nevada.—The Editor.)

As in the case of many other movements affecting human life and welfare, the movement for industrial safety and the prevention of accidents may be summed up in a sentence: 'The best safety device is a careful worker.' An examination of the statistics of industrial accidents that have been compiled in recent years demonstrates that the greatest number of accidents common to all industries are due not so much to dangerous machines or the absence of safeguards on machinery, but are due to the following simple causes:

Falling and slipping down stairs; falling on slippery floors; falling into open and unguarded pits or manholes; falling from unsafe ladders, stagings and scaffolds; the falling of objects, tools, and materials from overhead work places on fellow workers below; straining to lift too heavy loads, or unscientific methods of handling loads and materials; the careless use of hand tools; lack of protection against flying materials from tools and material that are being worked; projecting nails; removal of safeguards or the neglect to use the safety appliance provided; oiling machinery in motion; improper clothing; poor lighting of shops and work places; lack of good inspection, and carelessness on the part of the workers themselves.

Practical means of educating workers for cooperation in industrial safety are: Instruction in the causes of accidents, and the prompt discipline of workers found guilty of dangerous practices; organization of safety committees, especially of workmen's committees, to visit various departments of the industrial plant, to study the causes of accidents and to suggest ways and means of preventing such accidents in the future; the posting of bulletin boards of material calculated to impress the causes of the accidents, and personal responsibility in preventing them, upon the minds of the employes; the dissemination of safety information by means of leaflets, placards, and terse slogans on the pay envelopes; prizes for safety suggestions and accident prevention records; stimulating competition among employes and their cooperation with the management; motion pictures, lectures, safety rallies, in which the causes of the accidents and the methods of prevention are visualized, explained, and made practical by discussions based on personal experience. The results of two companies who have conducted safety first campaigns, similar to that just described, among their employes are as follows:

GENERAL ELECTRIC COMPANY

Pittsfield Works

Year	No. of Employes	No. of Lost Time Accidents	Percentage of Employes Meeting with Accidents
1912	4913	1850	37.6
1913	5852	1353	23.1
1914	4385	573	13.05
1915	3904	353	09.04
1916	5378	721	13.4

Decrease from November, 1912, to 1916, 64 per cent.

Schenectady Works

Year	No. of Employes	No. of Lost Time Accidents	Percentage of Employes Meeting with Accidents
1913	19977	1284	0.64
1914	16823	829	0.49
1915	15347	662	0.43
1916	20985	1355	0.67

Note.—A "lost time accident" is one causing a loss of time of 5 hours or more.

Some interesting facts developed from their investigations:

The most careful age was found to be 37 years.

The ages showing the most accidents in proportion to number of employes were between 22 and 26, and 50 years and over.

The hour showing the most accidents was from 9 to 10 a.m.

Fifty per cent of the accidents occur to new employes, i. e., those who have been with the company less than six months.

Contrary to general belief, the foreign born employes are exceptionally quick in acquiring the safety habit—if taught.

More accidents occur on Monday than on any other day. More accidents occur in the hot seasons than in the cold. Eighty per cent of the accidents are due to carelessness.

A chart of lost time accident classification given herewith shows comparisons for three years made by Fred T. Ley, Inc., contractors (mostly buildings), of Springfield, Mass. Using 1915, when they started systematic and organized safety work as a basis, the reduction in accident rate per 1000 employes for 1916 was 25%, and for 1917 55%. The highest quarterly reduction was 80%—for July, August and September, 1917. By way of comparison, the accident cost reduction for 1916 was 53% and for 1917 was 66%. A chart reproduced shows the different classifications, the number of accidents per 1000 employes, and the percentage of reduction in each year for different causes. For the future they intend to add four additional main causes and when the monthly compilation of this data shows any cause or causes running high in percentage they will have them subdivided for two or three months to locate the particular occupation requiring special attention.

PER CENT REDUCTION IN NUMBER OF LOST TIME ACCIDENTS PER THOUSAND EMPLOYES SHOWN BY YEARS

Classification of Accidents.	1915 1st Year No.	1916 2nd Year No.	1916 per Red.	1917 3rd Year	1917 per Red.
Handling material	72	55	24	33	54
Falling material	63	35	44	16	75
Employes falling	61	43	30	28	54
Handling tools	32	28	12	13	59
Nails	80	71	11	42	47
Flying material	12	*21	75	9	25
Machines	24	9	62	6	75
Miscellaneous	55	41	25	33	40
Total average reduction			25		55

*Increase.
30% of the accidents was eliminated by mechanical safeguards.
70% of the accidents was eliminated through safety education.

EXPERIMENTING WITH THE ELECTRIC FURNACE

BY WIRT S. SCOTT

(The annealing treatment and the forging of steel have a new meaning in these days of giant shipbuilding activity throughout the great sea ports of the West. Here is an excellent discussion of the electric furnace and its applications to the steel industry that is unusually timely and instructive. The author is commercial engineer for the Westinghouse Electric and Manufacturing Company and one who has given much time and thought to this important subject.—The Editor.)

The purpose of this paper is to place before the electrical engineers who are engaged in the iron and steel industry certain facts relating to an electric forging furnace which the Westinghouse Electric and Manufacturing Company has been developing.

Our experimental work on resistor type furnaces for forging has continued through several years. Our first investigation was with a granular graphite resistor bed 9 inches wide, 8 inches deep, by 36 inches long, for heating a furnace having an opening 36 inches wide, 24 inches deep by 10 inches high. Other resistor materials and various combination of materials consisting of granular graphite, coke, charcoal, and finally these materials in various combinations, also in combination with carbon blocks, were given exhaustive tests, always with the same general result. It is sometimes of equal importance to know the reasons for failures as it is to know the reasons for success, hence it should be of interest to know the reasons for discarding all of the above resistor materials as being unsuitable for an electric forging furnace.

To secure even moderately successful results, it was found that resistor material must be of the purest carbon or graphite. It is quite difficult to obtain a supply sufficient for operating furnaces.

If there is any slag or ashes left from the combustion of the resistor, it remains in the bed, so that the relative proportion of such material is gradually increasing with time, causing an increase in the resistance of the furnace.

If the slag or ash is fusible at the temperature of the resistor bed, a clinker will be formed which very rapidly extends through the granular mass, resulting in a rapid increase in resistance and consequent failure to heat.

When the furnace was maintained for a considerable length of time at sufficiently high temperature to turn out heated steel at 1800° F., we found that the temperature in the bottom of the resistor bed exceeded the safe limits of refractory materials. With a temperature of 1800° F. on the surface of the bed, it was found that the temperature at the bottom was approximately 3600° F. This great temperature difference is due to the electrical characteristics of carbon in that it has a large negative temperature resistance coefficient, that is to say, as the temperature increases, the resistance decreases. It is evident that the carbon at the bottom or at the center of the bed will operate at higher temperatures than the surface, which has an opportunity to radiate its heat to the surrounding air and chamber. An increase in temperature at any given part lowers the resistance through that part, which in turn causes more current to flow, and so on, the temperature gradually increasing with the current. Conditions tend to become stable at any very high temperature, but greatly in excess of that which may be safely withstood by any refractory material now available.

In heating a piece of work in an ordinary **fuel fired** furnace, heat is transferred to the work by conduction from the hot gases and by radiation from the walls. The walls are maintained at a temperature higher than that desired at the work because they are continuously swept by the hot gases. In an **electric** furnace we do not have this action to heat all the surface uniformly. If heat is generated only on the floor of the hearth, the side walls and roof must obtain their heat by direct radiation. If cold pieces of metal are laid closely over the surface of the resistor hearth, they will interfere with the radiation of the heat to the walls and roof directly in proportion to the amount of hearth surface they cover. This would mean that the work would be heated from the under side only, and instead of

receiving heat from the walls and roof, it would be giving off heat, thereby always having a great difference in the temperature in the two opposite sides. In order to heat the upper surface to a sufficiently high temperature, the lower surface must be overheated.

During the latter part of 1916, we began our experiments in using carbide as a resistance material. A study of the chemical and physical properties of silicon carbide led us to believe that it possessed desirable qualities essential to a suitable resistor for an electric forging furnace, but also indicated that there were many difficulties to be overcome which were real problems in themselves.

The temperature of formation of this resistor is 1950° C. (2542° F.).

The temperature of decomposition is 2220° C. or 4018° F.

There is no oxidation of this material in pure oxygen at 1000° C. (1800° F.). From 1500° to 1800° C. (2375° F. to 3272° F.) oxidation is very retarded by the fused silica coating. Neutral or reducing gases, such as carbon monoxide, nitrogen and hydrogen have little or no action.

The hardness is between the ruby and the diamond.

Specific Gravity

The specific gravity is 3.12 to 3.20. Based on a specific gravity of 3.20 the weight of one solid block without pores is 199.7 lbs. per cu. ft., or .116 lbs. per cu. in.

Tensile Strength

In order to adapt silicon carbide to its various uses the tensile strength of the bonded articles may be made to vary between wide limits. In ceramic bonded articles where the bond does not introduce objectionable physical or chemical properties, a tensile strength of 1400 lbs. per square inch may be attained. A sacrifice of resistance to heat changes and chemical actions affecting ceramic articles must be expected with high tensile strength.

Electrical Conductivity

The resistor is a conductor of the second class. At ordinary temperature its conductivity is very low, being several times less than carbon. With increase of temperature its conductivity increases very rapidly, as it has a large negative temperature resistance coefficient.

The resistivity of the bricks varies with differences in porosity and chemical composition. However, it is interesting to note that at temperature above 1800° F. the resistivities have approximately the same value. A general idea of the variation of the resistance will be obtained from the following:

75	deg.	Fahr.	.....	50	ohms	per	cu.	om.
1000	"	"	.....	18	"	"	"	"
1800	"	"	.....	3.7	"	"	"	"
2550	"	"	.....	0.65	"	"	"	"

From a resume of the above, it may be seen that this resistor material possesses the following excellent qualities:

(1) The temperature of decomposition is above 4000° F., which is approximately 1500° higher than the hottest temperature required at the surface of the resistor. Due to the construction of furnace employed, the atmosphere in the furnace chamber is non-oxidizing, and under these conditions the resistor is non-consuming.

(2) May be molded in block form, allowing the heating element to be placed in any desirable position around the heating chamber.

(3) Due to its high tensile strength, the roof of the heating chamber, as well as the hearth, may be made out of these resistor blocks.

(4) The fact that it has a large negative temperature resistance coefficient may be utilized in the control of the furnace temperature by controlling the current input to this resistor material.

The first complete furnace of this type which we built and gave promise of success had an outside dimension 41 inches wide across the front, 27 inches deep and 48 inches high. It was designed with two working chambers 7 inches long by 5 inches high, for the heating of 50 pounds of steel per hour to 1800°F. in each chamber, or a total of 100 pounds per hour for the furnace. The resistors consisted of blocks having a cross section of 4½ inches by 2½ inches passing above and below the working chamber. The resistors terminated in electrode chimneys filled with granular graphite, into which steel terminal plates extended, for external connections.

Owing to the high resistance of this type of furnace when cold, and due to the length of resistors used, a starting voltage of 220 volts was required, which was cut down in a few minutes' time to 110 volts, and then gradually reduced until 60 volts was reached, which maintained the proper temperature.

The time required to bring the furnace up to an operating temperature of 1800° F. was eight hours, starting with the furnace cold. Owing to the great heat reserve capacity of the furnace, the time required in successive heatings was greatly reduced, depending upon the length of time the furnace was out of operation. In order to have the furnace available for immediate use, sufficient current was maintained on the furnace during the nights to supply the radiation losses. On a 20 hour continuous forging test the average input was about 18 kw., or 300 amperes at 60 volts. The charge during this test consisted of approximately four pieces of steel weighing six pounds total, each piece requiring an average of three heats, one from cold to 1800° F., the other two from about 900° to a final temperature of 1800° F. The hourly output averaged 20 pounds heated from 70° to 1800° F. and 40 pounds from 900° to 1800° F.

No special attention was given to the thermal insulation of the furnace since that was of secondary importance, and a matter which could be taken care of at a later date, once we secured a suitable construction. Notwithstanding the light insulation that was used, a furnace efficiency of 41° was maintained. The furnace ultimately proved unsatisfactory due to unequal heating of the two chambers.

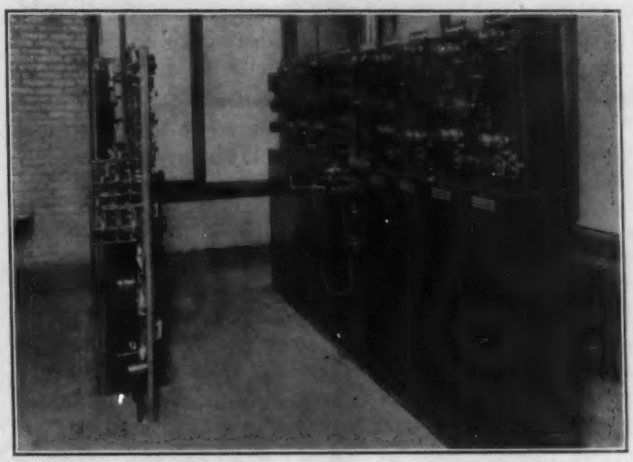
The results of the tests proved conclusively that a temperature of 1800° F. could be obtained and maintained for an indefinite period so far as the resistor material was concerned.

THE PRINCIPLE OF MULTIPLEX TELEPHONY

(The recently announced achievement of conducting five telephone conversations over one pair of wires is unquestionably the most important of the many advancements in telephony which the last few years have brought. The principles upon which this accomplishment has been based are here discussed in a non-technical way by the acting chief engineer of the American Telephone Company.—The Editor.)

Following is a part of the interesting statement of Bancroft Gherardi, acting chief engineer of the American Telephone and Telegraph Company, on the subject of the new multiplex telephony:

Before applying the new system, the pair chosen between Baltimore and Pittsburgh was operating as follows: In addition to carrying a telephone circuit of the usual type, each wire of the pair was



The apparatus at Tuxedo, just outside of Baltimore, used for connecting five Washington circuits to one Pittsburgh circuit

equipped with composites for duplex telegraph working, and, further, that portion of the circuit from Baltimore to Dallastown was combined with another pair into a phantom telephone circuit. Without disturbing the working of any of these arrangements, by means of our multiplex system we superimposed on the wires in question four additional telephone circuits, together with the complete signalling arrangements necessary to operate them. Both the talking and signalling on these new circuits provided by means of the multiplex were as good as the ordinary telephone circuit provided in the ordinary way.

It is difficult to explain in non-technical language how it is possible to carry on five telephone conversations simultaneously over a single pair of wires. It is necessary to send over this pair of wires five different electric currents at the same time and to provide means so that at the ends of the pair of wires these currents may be completely separated from each other, so that each current coming from one particular telephone at one end may go to a particular telephone at the other end, although on the toll line the five currents have all been mixed together. The problem is to so modify each current before it goes on to the multiplexed part of the circuit that each current, while preserving its ordinary characteristics, has imposed upon it a new characteristic which will enable the apparatus at the receiving end of the circuit to distinguish the currents from each other. This is done by combining each ordinary telephone current with a carrier current of definite higher frequency. The frequency or the wave length of each of the carrier currents is different from that of the other carrier currents used on the same pair of wires and is adjusted to the separating devices at the distant end of the line.

The underlying principle may be illustrated by considering a composite photograph of five individuals. Given such a composite photograph of the ordinary kind, it would obviously be impossible to derive from it the picture of each of the five individuals going to make it up. If, however, the composite photograph had been made up in five different colors, the picture of each individual being in a different color, say, one red, one blue, one green, one yellow, and one violet, it would then be possible, by looking at the picture through colored glasses, to see any one picture separate from the others. If red glasses were used, the picture printed in red only would be seen; if blue glasses, the picture in blue, etc., although when looking at it in the ordinary way all of the pictures would be seen together and only the combination would appear. As the tint of each picture serves as a means of differentiating it from the others, so the frequency of the carrier currents serves to differentiate each of the conversations in the new telephone multiplex.

Some of the men who have been closely connected with the development of the multiplex telephone. From left to right (standing)—H. J. Vennes, Western Electric Co.; E. O. Scriven, Western Electric Co.; Lloyd Espenschied, A. T. & T. Co.; H. A. Affel, A. T. & T. Co.; H. F. Kortheuer, Western Electric Co.; J. R. Carson, A. T. & T. Co.; R. A. Heising, Western Electric Co.; John Davidson, Jr., A. T. & T. Co. (Seated)—H. D. Arnold, Western Electric Co.; O. B. Blackwell, A. T. & T. Co.; E. H. Colpitts, Western Electric Co.; B. W. Kendall, Western Electric Co.; H. S. Osborne, A. T. & T. Co.

Naturally, to accomplish these results considerable amounts of apparatus are required at the terminals of the multiplex lines, and there are also required changes and rearrangements in the wires themselves. It is for this reason that the system, while physically applicable to wires, either long or short, is economically limited in its usefulness to long wires. On subscribers' lines or on short local or suburban trunks, its cost and the complications would not be justified.

SAVING THE WASTE IN THE CHIMNEY---IV

BY ROBERT SIBLEY AND CHAS. H. DELANY

(The loss of draft in boilers, flues and turns is a matter of prime importance in any study of increasing chimney and boiler room economy. Herein is treated by the authors of the recent book on "Elements of Fuel Oil and Steam Engineering" a discussion of several important points connected with chimney draft in the modern steam power plant.—The Editor.)

DRAFT LOSSES IN STEAM POWER GENERATION

The loss of draft is greatest in boilers having the largest path of gases, the greatest velocity, and the greatest number of changes in direction of flow of gases. A boiler having a single pass with the hot gases entering at the bottom and leaving at the top has a minimum draft loss. In most designs of boilers, however, this arrangement cannot be adopted as the area of gas passage would be too large. This would result in the gases short circuiting, that is passing in a narrow stream from one corner to the other without coming in contact with all of the heating surface. To make the heating surface effective in absorbing heat from the gases it is therefore necessary to provide baffles in the boiler, which deflect the gases and cause them to travel back and forth until their temperature has been reduced as much as possible.

The arrangement of baffles is a feature of boiler design and need not be entered into here. It is well, however, to refer briefly to the general principle involved, namely, that the higher the velocity of gases traveling over the heating surface the greater will be the coefficient of heat transfer. Consequently it would seem that in order to insure maximum efficiency of the boiler there should be a large number of passages of small area, so as to insure high velocity to the gases. This is true up to certain limits, but unfortunately it is soon found that the additional loss of draft caused by increased friction and extra changes in direction of the gases makes the production of the required draft both difficult and expensive.

Saving the Waste in the Chimney is accomplished not by the chimney itself but by the boiler, for it is the boiler that cools down the gases before they enter the chimney. Consequently the design of the baffles of the boiler is very closely related to the subject in hand. In the majority of water tube boilers the baffles are arranged for three passes, that is the gases are forced to travel the length or height of the boiler setting three times before reaching the stack. With this arrangement the areas of passes are such as to give the gases a velocity of 10 or 15 ft. per second when the boiler is operating at its rated capacity. By increasing the number of passes to four or five the velocity may be increased to 20 or 30 ft. per second. This results in a higher rate of heat transmission so that more heat is absorbed from the gases, reducing their temperature and resulting in less waste to the chimney.

To enable the number of passes in a boiler to be increased the chimney must be designed to suit the increased loss of draft that will occur. Thus in every case the actual draft loss should be determined as closely as possible, and the actual figures for the particular case in hand used in designing the chimney. It is desirable in all cases to design the stack for a greater draft than is expected, for it is a simple matter to reduce the draft by closing in on the damper, whereas if the draft is insufficient nothing can be done to increase it. Again, it may be desired at some future time to increase the number of passes in the boiler, or otherwise modify the baffles in such a way as to require more draft. This would be impracticable unless the stack is large enough to produce a surplus of draft.

In order to give the reader some general ideas of computations involved in ascertaining draft losses assumed in design we shall now pass to a brief consideration of this problem.

Loss of Draft in Boilers. The loss of draft through a boiler proper will depend upon its type and baffling, and will increase with the per cent of rating at which it is run. For design purposes, it may be assumed that the loss through a boiler will be 0.25 in. when it is run at its rating, .40 in. at 150% of its rating and .70 in. at 200% of its rating.

Loss in Flues and Turns. With circular steel flues of approximately the same size as the stock or when reduced proportionally to the volume of gases they are to handle, a convenient rule is to allow 0.1 in. draft loss per 100 ft. of flue length and 0.05 in. for each right angle turn. These figures are also good for square or rectangular steel flues with areas sufficiently large to provide against excessive frictional loss. For losses in brick or concrete flues these figures should be doubled.

Thus the loss in draft flues and turns for an installation having a flue 100 ft. long and containing two right angle turns is

Loss for flues, per 100 ft.	0.1 in.
Turns—2 x .05	0.1 in.
	0.2 in. loss.

Total Available Draft Required. We are now enabled to compute the total available draft required for a boiler installation by summing up the separate components required for the furnace, for the boiler, for the flues and for the turns.

Thus in the illustration carried through from the previous discussion we find that the total available draft is

$$0.6 + 0.4 + 0.1 = 1.2 \text{ in.}$$

The simple rules brought out in this discussion should, when thoughtfully applied, aid the engineer in checking over the economy of his installation and in case of a new design they should serve as axioms for efficient practice in saving the waste in the chimney.

SPARKS—Current Facts, Figures and Fancy

(The United States now supplies nearly one-half of all the manufactures imported or exported in the world, the largest radio station is at present located in America, we seem to be free from tigers and elephants—but some of the other countries are enterprising as well, as indicated by the following brief items of interest from all over the world.—The Editor.)

Two hundred thousand pounds of lemon drops were being used every month by our soldiers while the war was on. So great was the demand that special precautions were taken to secure pure materials and government orders to this amount were distributed through the country to be made by a specified government receipt.

* * *

Are we overlooking ability for higher positions among the office girls? That clerks in the government employ advance more rapidly than stenographers is the complaint of a young woman now in the employ of the Emergency Fleet Corporation who suggests that a little training along other lines offered to these workers will produce material especially available for higher lines of work.

* * *

Telephone wire is the sine qua non of the trenches. It is used to hang pictures on the walls of the dugouts, to mend cots and to make them. Men who have been "over there" have said that frequently soldiers have stopped in their pursuit of the Hun to gather bits of telephone wire lying along the blood-soaked fields of No Man's Land.

* * *

The toll of the influenza has been appalling, but at least it is a temporary affair. What if this country were infested with snakes like India, where snake bite causes some 24,000 deaths yearly. Two thousand one hundred and seventy-six persons were killed by wild beasts in 1917, which was a marked reduction over the year before. Among those responsible were tigers, wolves, elephants, hyenas, pigs and crocodiles.

* * *

Holding church services by telephone was one result of the influenza epidemic. This was done by one church in Muncie, Ind., which arranged that at 10:30 o'clock, through the cooperation of the local telephone company management, the telephones of all subscribers who wished should be connected with the telephone in the church, to which a special sounder was attached. The church organist also played a few numbers.

* * *

The Osaka Electric Railway Company, an interurban railway running between Osaka and Nara through the great tunnel of Ikoma, has made quite an innovation in utilizing its tunnel as a summer feature for pleasure passengers. The temperature in the tunnel is so low that quite a cooling effect is obtained in riding through it, the company offering a special discount for tunnel riders during the summer.

A recent fair held in Sweden brings out the shortage of oil and the many substitutes and methods of economy displayed. The efforts of the lighting industry to find a substitute for the kerosene lamp are shown at the fair in the form of carbide lamps for use in places where there is no electric current—a battery lamp called the "Mercal," and also the Jungner primary elements intended for the electric lighting of entire buildings.

* * *

The United States is now supplying nearly one-half of all the manufactures that enter the national commerce of the world, according to an English journal. Five years ago she stood third on the list of exporting countries. Today she is so far ahead—the value of her exports being practically double that of England—as to be in a class by herself. This, of course, is purely a war condition and its maintenance in any degree is dependent on the enterprise of American business in the next few years.

* * *

The displacement of riveting by electric welding in ship construction is being considered in English insurance circles, with regard to possible reduction in rates. It is claimed that welded plates stand the impact test as well as riveted plates, but underwriters require further information on the question of the results of stranding and collision. The cost of electric welding is stated to be much below that of riveting, and if similar insurance rates may be secured will undoubtedly supplant riveting to a great extent.

* * *

The radio station at Annapolis is still the largest and most powerful in the world. It has sent messages to Panama and Honolulu in the west and to Rome in the east. There is reason to believe that the station now being completed by this government in Bordeaux will be powerful enough to communicate directly with the Philippines, thus completing the circle around the world. It is regarded only as a matter of time until this result is possible.

* * *

Deep diving a hundred or more miles inland is one of the items of expense on the account of the Pacific Gas and Electric Company. The intake to the water supply above the hydro-electric plant operated by the company in Croada Pass had become clogged with logs and debris 100 feet below the surface of the lake, and until the passage was cleared it was impossible to run the plant to capacity. It was therefore necessary to use a diver who had to operate from lines suspended from cliffs nearly 100 feet in height.

PERSONALS

A. W. Childs, superintendent of sales for the Southern California Edison Company, has been appointed chairman of the commercial committee of the Pacific Coast Section, N. E. L. A., to succeed E. B. Walthal, who has resigned on account of ill health resulting from a severe attack of influenza. Mr. Childs has been in the service of his company for 17 years, having served as district agent at Pasadena, Long Beach and Redlands, and for the past five years as assistant general agent, during which period he has had under his especial attention all sales of power, light, apparatus and appliances for his company, which totals a volume in annual returns equaled by few other similar companies in the world. The commercial problems of readjustment that confront the industry at this period are unusually interesting and of great importance to the West. It is confidently believed that the commercial reports at the great Coronado convention, the latter part of April, will be brimful of helpfulness due to the strong composition of this committee under the able leadership of Mr. Childs. The other members of the committee are: W. S. Berry, J. B. Black, C. M. Brewer, C. O. Case, S. W. Coleman, H. H. Courtwright, C. M. Einhart, W. L. Frost, H. J. Kister, F. A. Leach, L. H. Newbert, C. S. Northcutt, C. Remschel, T. W. Simpson, E. B. Walthall, P. M. Wentworth.

Frank Karr, president of the Pacific Electric Company, Los Angeles, has been a recent visitor in San Francisco.

A. H. Schmidt, with the Manila Electric Railway and Light Company of Manila, P. I., is a recent San Francisco visitor.

G. F. Wakeman of the Edison Storage Battery Company, with headquarters in San Francisco, is East on a business visit.

L. E. Hinman, formerly city electrician for Medford, Oregon, is now with the engineering force of the Southern Pacific Company at Portland.

J. Lewis Foulk, official of the United States Steel Products Company, arrived in San Francisco from Pittsburg, Pa., recently to confer with local officials of the corporation.

G. E. Arbogast, president of the Southern California Association of Electrical Contractors and Dealers, with headquarters in Los Angeles, is a recent San Francisco visitor.

Lieutenant N. H. Silver has been appointed Northwest representative of the transmission line department of the Pacific States Electric Company, with headquarters in Seattle.

J. C. Manchester of the Economy Fuse & Manufacturing Company, with headquarters in San Francisco, has fully recovered from his recent illness and is again able to attend to business.

Lieutenant A. E. Morphy has received his honorable discharge from the army and has resumed his duties as secretary of the Southern California Edison Company at Los Angeles.

John B. Miller, chairman of the board of the Southern California Edison Company and recently appointed chairman of the Pacific Division of the Red Cross, has recently spent some days in San Francisco in work connected with the Red Cross.

Carl H. Fry has been appointed safety and efficiency engineer for the California Metal Producers' Association with headquarters in San Francisco, to succeed Edwin Higgins, resigned.

Max Loewenthal, Pacific Coast representative of the Panama Lamp Company, is again in his San Francisco office after a profitable business trip to New York City covering several weeks' duration.

Bert Hansen has resigned his connection with H. B. Squires Company, manufacturers' agents of San Francisco, in order to join the sales organization of the Cutler-Hammer Manufacturing Company at Milwaukee, Wis.

W. H. Ellison of the San Diego Consolidated Gas & Electric Company has been elected president of the employes' association of that company. Other officers are: Vice-president, **W. A. Lambert**, and secretary-treasurer, **R. B. Tallman.**

W. D'A. Ryan and **A. F. Dickerson**, illuminating engineering experts for the General Electric Company with headquarters at Schenectady, N. Y., are recent Pacific Coast visitors, stopping off at Los Angeles, San Francisco, Seattle and other business centers.

K. I. Dazey, formerly manager of collections with the Pacific Gas & Electric Company, has taken the position of purchasing agent with the Schaw-Batcher Company, the well-known manufacturers of pipe, who have recently included shipbuilding in their range of industrial activity.

H. Alex Hibbard, general sales agent of the T. & W. Universal Plug Company of Santa Ana, California, is a recent San Francisco visitor. Mr. Hibbard is making a business visit through California and the Northwest and will return to his headquarters at Denver the middle of January.

Meiji Nakoa, chief electrical engineer for the Furukawa Mining Company, Tokio, Japan, has been visiting various points in Canada and the United States investigating electric furnace practice and was recently in Toronto. Mr. Nakoa, who is also a large owner of mining interests in Japan, stated that they pay a half-cent per kw-hr. for hydroelectric power at the mines.

K. E. Van Kuran, Los Angeles manager of the Westinghouse Electric & Manufacturing Company, is a recent visitor to San Francisco, as is also **A. E. Wishon**, assistant general manager of the San Joaquin Light & Power Corporation, both of whom attended the recent meeting of the Advisory Committee of the California Electrical Cooperative Campaign held in San Francisco.

Percy A. Cupper, recently appointed State Engineer of Oregon to take the place of John H. Lewis, resigned, has been connected with Oregon engineering matters for some years. He began his work for the State of Oregon in 1905 and except for a few months of private practice, has been employed by the state ever since. He was closely associated with Mr. Lewis in the passage of the Oregon water code and was personally responsible for the working out of the system of surveys and investigations upon which this was based. His work is seen in the establishment of a system of rural credits and in the present irrigation code and Oregon Irrigation Law, which is, like the water code, serving as a model for similar legislation elsewhere. Mr. Cupper has specialized in law work as well as engineering and his special preparation and experience peculiarly fit him for the position he now occupies, in which he is counted upon to keep Oregon in the foremost rank along engineering lines, which it has hitherto held under the capable leadership of John H. Lewis.

Major John D. Galloway, a consulting engineer of San Francisco, has returned from active service in France where he has had many interesting experiences in the engineering corps of the United States Army. It will be remembered by readers of the Journal of Electricity that Mr. Galloway has been associated in past years with many of the major engineering enterprises of the West, among which may be mentioned the stringing of the long span of wires across Carquinez Straits in California, which until quite recently was for years the longest span of aerial wire in the world.

F. S. Mills, resident agent for the National X-Ray Reflector Company at San Francisco, has returned from an extended trip through Oregon, Washington and British Columbia. He reports that business conditions are rapidly returning to normal and an optimistic feeling throughout the trade.

E. W. Wagy, petroleum technologist of the U. S. Bureau of Mines, has left San Francisco for an extended trip through Texas, Louisiana and Mid-Continent oil fields for the purpose of making a special study of methods used in those districts in the matter of perforating casing and setting screen pipe. Mr. Wagy is preparing a bulletin covering these subjects which is soon to be published by the Bureau of Mines.

H. Foster Bain, assistant director of the U. S. Bureau of Mines, spent several days during the month of January in San Francisco, visiting the U. S. Bureau of Mines station at Berkeley and the petroleum division at San Francisco. In company with Dr. Duschak, superintendent of the Berkeley station, he left on January 24th en route to Washington, intending to stop on his way to visit the Bureau's station at Tucson, Arizona.

Lieutenant Ralph W. Reynolds, of the 37th Engineers, formerly with the engineering staff of the Pacific Pipe and Tank Company, was one of the first in the occupation of Coblentz and had the pleasure of watching the German army vacate this great center. Readers of the Journal of Electricity will recall that Mr. Reynolds contributed several interesting articles to the columns of the Journal of Electricity on Peruvian engineering life covering features of his work with the Cerro de Pasco Mining Company.

Lieutenant-Colonel A. H. Griswold, plant engineer for the Pacific Telephone & Telegraph Company, who has performed unusually helpful service abroad in establishing telephonic communication among the American Expeditionary Forces in France, has returned to his San Francisco office with the telephone company. Engineers of the West, particularly members of the American Institute of Electrical Engineers, are loud in their admiration and praise for the excellent technical service he rendered the nation in its hour of need.

W. E. Coman, vice-president and general manager of the Northwestern Electric Company of Portland, will be the new vice-president and general manager of the Washington Water Power Company, to succeed Harry L. Bleecker, deceased. Mr. Coman, who is one of the best known light and power men in the Northwest, will assume his duties about March 1. Mr. Coman is well known to the transportation men of the Northwest, having been for years associated with the traffic department of the Great Northern, Spokane, Portland & Seattle, and O.-W. R. & N. roads.

Max Thelen, former chairman of the California Railroad Commission, has been appointed head of the division of public service of the Federal Railroad Administration. He will deal primarily with the relations between the public, including shippers, and the railroad administration and the Federal controlled railroads. Judge A. C. Prouty, head of the combined divisions, will become director of the division of accounting. This appointment has been made by Director-General Hines in view of the separation of the former division of public service and accounting which became effective February 1st.

John Clausen, vice-president of the Crocker National Bank of San Francisco, has just been made a vice-president of the Chemical National Bank of New York City. Mr. Clausen's appointment is of unusual interest to readers of the Journal of Electricity in that he has contributed many helpful articles to its columns on increasing international friendly banking relations with the Orient. Electrical engineering and electrical products are becoming of increasing importance in the upbuilding of our Pacific Coast relations with countries bordering the Pacific and Mr. Clausen, through the Journal of Electricity, has wonderfully assisted in this great work.

K. Uchida, former vice minister of communication of Japan, was a recent visitor in San Francisco where he announced that communication between San Francisco and Japan will be improved within the next two years by the laying of two new cables between that city and two cities of the Mikado's country. The initial agreement, according to Uchida, provides that the cables are to be built, operated and controlled jointly by this country and Japan. It is known that San Francisco will be the terminus for both cables, and that one will terminate at Yokohama, but it has not been decided at which city in Japan the other will end or whether the lines will touch at Honolulu.

OBITUARY

W. J. Hammond, assistant engineer in the gas and electric department of the California Railroad Commission, died of influenza Sunday, February 2, 1919.

E. H. Jacobs, superintendent of the Western States Gas & Electric Company at Stockton, California, died of influenza during the last week in January.

B. J. Simpson, agent of the San Luis Obispo and Paso Robles district of the San Joaquin Light & Power Corporation, passed away February 4, 1919, after ten days illness from influenza. His loss is keenly felt in the great district he so efficiently served. He was formerly with the Southern Sierras Power Company and proved an able man in handling affairs of his company having to do with the public.

Clarence Netzen, chemical engineer, of the U. S. Bureau of Mines, with headquarters at the Bartlesville Station of the Bureau, died suddenly of pneumonia following an attack of influenza at Bartlesville, December 11, 1918. Mr. Netzen had just returned from a trip to San Francisco and Los Angeles, where he had been engaged in Bureau work in connection with the Ordnance Department Toluol Plant at Vernon, California. Presumably he contracted the disease en route between San Francisco and Oklahoma, as he was in perfect health on leaving San Francisco six days previous to his death.

Errata Notes: In the excellent article on "Electric Generation by Diesel Engine" under the authorship of E. J. Richards, appearing on page 167 of this issue, should read as follows: Eighth line, second column, 425000 pounds instead of 42,500 pounds; on page 168, 2nd line, first column, 2300/4400 volts should read 2300/44000 volts.

The Reconstruction Issue of the Journal of Electricity, Jan 1, 1919, has been completely exhausted and many unfilled orders are on file. Twenty-five cents will be paid for each copy that is returned in good condition to the office of the Journal of Electricity.

MEETING NOTICES FOR ELECTRICAL MEN

(Considerable activity marks western societies during the last two weeks. Interesting programs have been presented at local meetings—and comprehensive plans made for conventions and meetings to come. The Jovian Order plans its reconstruction along other lines—and the A. S. M. E. announces the taking over of the Engineering Index.—The Editor.)

San Francisco Electrical Development League

The meeting of the San Francisco Electrical Development League for Monday, Jan. 27, 1919, proved of unusual importance to the industry. Arthur Kempston, head of the department of electricity for the city of San Francisco, as chairman of the day, introduced a discussion of the situation of the base board receptacle in the use of electrical appliances. E. N. Brown, chief engineer of the Majestic Electric Development Company, showed how the manufacturer can cooperate by putting out good quality. W. D. Kohlwey, a prominent contractor-dealer, pointed out the difficulties under which the dealer labors in selling appliances that he knows should not be connected up to fixtures but by means of the base board receptacle. Clyde Chamblin, president of the San Francisco division of the California Association of Electrical Contractors and Dealers, showed why the base board receptacle is a growing necessity. L. H. Newbert, chairman of the Advisory Committee of the California Electrical Cooperative Campaign, pointed out how the central stations are perplexed with the problem and how only by tact, patience and education can relief be expected.

The following committee was appointed to investigate the problem and report recommendations at some future meeting: Arthur Kempston, chairman, E. N. Brown, W. D. Kohlwey, Clyde Chamblin, L. H. Newbert and A. H. Halloran. During the first two weeks of February meetings were held covering the problems of reconstruction and on the consular service. At the meeting of February 3rd, Ralph T. Fisher, district vocational officer of the Federal Board of Vocation and education, spoke on "Reclaiming Disabled Soldiers." Dr. Linn T. White, recently returned from the war zone, told of his experiences on the Western Front at the meeting of February 10th. George W. Fishbeck of the U. S. Consular service spoke on "Consular and Diplomatic Practice." Officers were elected as follows:

President, Henry Bostwick, S. F. District Mgr. P. G. & E. Co.; vice-president, E. O. Shreve, S. F. Mgr. G. E. Co.; 2nd vice-president, J. F. Pollard, Commercial Dept., Sierra & S. F. Power Co.; secretary, J. W. Redpath, secretary California Ass'n Electrical Contractors and Dealers.

The February 24th meeting is planned as a joint luncheon with the Business and Professional Women's Club of San Francisco with an especially interesting program.

San Francisco A. S. M. E.

"Electric Arc Welding" was the subject of a most interesting discussion at the February 13th meeting of the San Francisco A. S. M. E., held at the Engineers' Club on that evening. The speaker was F. A. Anderson, electrical inspector U. S. Shipping Board, and formerly in charge of arc welding work at the Hog Island yard, who spoke with authority from the electrical standpoint. A general discussion of the relative merits and different uses of electric arc and oxy-acetylene welding followed. The lecture was well illustrated with lantern slides.

Robert Sibley, editor of the Journal of Electricity, has been chosen by the San Francisco and Los Angeles sections, A. S. M. E., to act on a national committee of five to nominate national officers of the society.

Pacific Service Employees' Association

The first meeting in 1919 of the Pacific Service Employees Association was held at the Elks Club, San Francisco, at 8:15 o'clock Tuesday evening, February 11th. The entertainment committee had provided a one-act playlet called "The Ninety Thousand Girl" which proved most entertaining. The cast was selected entirely from the association membership and the playlet produced under the personal direction of Frank Mathieu, for ten years director of the Bohemian Club "grove plays." The Bohemian "Jazz" Quartet provided incidental music and dancing was enjoyed later.

Joint Meeting at Portland

A joint meeting of the N. E. L. A. and A. I. E. E. of Portland, Ore., was held at Library Hall, Multnomah County Library, at 8:00 p.m. Feb. 4, 1919. A paper illustrated by moving pictures and lantern slides, "Deep Water Submarine Telephone Cable," was presented by Mr. H. J. Sheppard of Seattle, Wash., who described the laying of one of the longest submarine cables on the Pacific Coast across Puget Sound.

Meeting of Advisory Committee, California Electrical Cooperative Campaign

The advisory committee of the California Electrical Cooperative Campaign held a most important meeting on Friday, February 7, 1919, at which plans for the coming year were discussed in full detail. Announcement of these plans is given in full elsewhere in this issue.

Attention was called to a very effective course in electrical contracting, wiring, motor installation and study of the elementary laws of electricity that is being planned by the Extension Division of the University of California, in which the Journal of Electricity has offered its columns for furthering of this important educational work. By unanimous vote the committee decided to cooperate in every manner possible in this effort of the University Extension division to be of ever increasing value to the State.

BUILDERS OF THE WEST—XLVII

THOMAS A. EDISON

Seventy-two years ago this month there was born an inventor, the products of whose genius will live as long as human intelligence is able to combine material elements for lifting the burdens of the human race. From the harnessed waterfall in the mountain fastnesses of the West to the triumph in electrical illumination at the wonderful Panama-Pacific Exposition we witness the fruits of his labor. To Thomas A. Edison, marvelous inventor and withal a modest and exemplary citizen, this issue of the Journal of Electricity is affectionately dedicated as a lasting memorial to his enduring work for the West.

An informal luncheon was held at the noon hour, the following guests being present: Harry Bostwick, manager San Francisco District, Pacific Gas & Electric Company; Waldo Coleman, general manager Coast Counties Gas & Electric Company; J. B. Black, salesmanager Great Western Power Company; M. A. De Lew, president California Association of Electrical Contractors and Dealers; J. F. Pollard and Wm. McKinley, Sierra and San Francisco Power Company; and W. M. Deming and Robert Sibley of the Journal of Electricity.

Quarterly Meeting of the California Association of Electrical Contractors and Dealers

The quarterly meeting of the California Association of Electrical Contractors and Dealers was held in San Francisco on Thursday, Feb. 8, 1919. The meeting proved unusually helpful in clarifying several problems that had arisen in the jobbing and dealer fields of activity. The plans for the year in the Cooperative Campaign were outlined and unusual interest was manifested.

Seattle Section, A. I. E. E.

The meeting of the Seattle Section, A. I. E. E., on Jan. 21st, was a very interesting and profitable one for those attending. The business of the evening included a discussion of the benefits and plans of the Associated Engineering Societies of Seattle. This matter will be taken up in detail at the next meeting.

Capt. Norwood W. Brockett, a Captain of Artillery, recently returned from France, gave an instructive talk on some of the experiences he had gone through and some of the difficulties to be overcome in connection with his work. From a small harbor at Brest, with facilities for landing only one vessel at a time, a wonderful system of docks and railroad yards comprising miles of sidings, has been built up in marvelously short time. Just as the American soldier made a fighter to be feared, and learned the game in a comparatively short period because of his versatility, so the engineer that transported the soldier and his supplies to the front line trenches has made good and proved America's worth.

A great deal of work has been done in organizing the Associated Engineering Societies, but due to war conditions, the plans for the benefit of the member associations have been delayed. A renewed interest is now apparent, and a large attendance at the next regular meeting is absolutely necessary in order that a thorough familiarity with the subject be gained from the discussion. The following committees were appointed:

Executive—John Harisberger, chairman, T. C. Smith, secretary, A. A. Miller, J. D. Ross, C. E. Magnusson.

Papers and Meetings—G. E. Quinan, chairman, C. A. Whipple, O. L. Coward, L. F. Curtis.

Membership—J. Hellenthal, chairman, R. L. Rockwell, G. H. Moore, Lewellyn Evans, W. T. Batchelder.

Councillors on Joint Council of Associate Engineers' Society of Seattle (Room 320, Boston Block)—A. A. Miller, term expires Dec. 31, 1920; W. R. Hendry, term expires Dec. 31, 1919.

Oregon Society of Engineers

The annual meeting of the Oregon Society of Engineers was held at the University Club, Monday, Feb. 3. Fred Lockley told the members interestingly about his experience and observation in the camps and on the firing line in France. Measures before the Legislature in which engineers are interested were discussed.

Joint Engineering Societies of Seattle

At the meeting of the Joint Engineering Societies of Seattle on Jan. 22, held under the auspices of the local branches of the American Chemical Society and the American Society of Civil Engineers, Dr. R. S. G. Byers, recently a Captain in the Chemical Warfare Service at American University, recounted some of the tasks assigned to them and the dangers attendant thereon. The relating of actual occurrences connected with explosions of varying magnitude in the progress of the tests was sufficient to convince the audience that real work was being done. Incendiary and gas shells were made up and tried out by firing from cannon and watching the results under field conditions.

Mr. John L. Hall, one of Seattle's prominent civil engineers, read a paper on "Engineering Education," in which he urged a closer relationship between the engineering profession and the student in the engineering college. Discussion of the paper followed, in which Prof. Magnusson of the University of Washington presented the plan of alternating the student between class work and practical work in the shop, according to the Cincinnati plan, but at longer intervals. These intervals might be chosen at will, even as long as three months practical work intervening between class room instruction periods. That this would require a large labor turnover for the shops was the chief objection voiced in the discussion.

Plans for Reconstruction of Jovian Order

An unofficial committee composed of members of the St. Louis Jovian League proposed to Jupiter's Cabinet on Jan. 17 that the Jovian Order be expanded into the National Electrical Board of Trade. It is also proposed to have the activities of the organization primarily business instead of pleasure.

A membership of at least 100,000 is expected, and no change has been suggested in the present optional dues of $2, $5, $10 or $20 per year. The important electrical interests would be asked to guarantee sufficient individual memberships to finance the board during the period in which the plans are being put into effect. When the project gets to be self-supporting all such underwriting payments would be refunded.

The Engineering Index

The Engineering Index, published for 25 years in The Engineering Magazine and its successor, Industrial Management, and universally regarded as the standard index to engineering periodical literature, has been acquired by The American Society of Mechanical Engineers, and hereafter will be compiled and published by that society. As heretofore, The Engineering Index will be regularly issued in three different forms:

1. As a part of The Journal of the Society.
2. As a separate monthly publication for libraries or individuals desiring to clip the items for indexing purposes.
3. As an annual volume in which all the items for the year are collected.

The Engineering Index originated with Prof. J. B. Johnson of Washington University, St. Louis, Mo., in 1883, and for 12 years was prepared under his direction and published by the Association of Engineering Societies. It was then taken over by The Engineering Magazine Company of New York and has since had the personal attention of Mr. John R. Dunlap, the president of that company, who has found it to be a widely appreciated undertaking by engineers throughout the world. The development of his magazine in the specialized field of industrial management, however, made it seem desirable to place The Index in the hands of an engineering organization covering a broader field and serving engineers engaged in more varied activities.

Through the facilities afforded by the magnificent library of the Engineering Societies, which regularly receives 1,100 periodicals from all parts of the world, the Society has unlimited possibilities in publishing The Index. These periodicals comprise one of the most complete collections of current engineering literature in the world—in not less than ten languages and received from thirty-seven countries. The indexing of engineering articles can be best accomplished by a professional organization and the Society will consider it one of its greatest services to place at the disposal of engineers, through the Engineering Index in The Journal, the means for using the wealth of data and general information published from month to month in the world's technical press.

San Francisco Section, A. I. E. E.

The last meeting of the San Francisco Section, A. I. E. E., was held at 7 o'clock, Friday evening, February 7, in the rooms of the Engineers' Club, Mechanics Institute Building, 57 Post street. The subject of the "Unification of Manual and Automatic Telephone Systems at Los Angeles" was taken up by D. E. Wiseman, equipment engineer of the Pacific Telephone & Telegraph Company. Mr. Wiseman's paper dealt with a subject considered by telephone men to be one of the milestones in the history of telephone engineering. The speaker outlined what had been accomplished and how it was done. The paper was well illustrated with a number of diagrams of particular interest.

The meeting held on January 24, 1919, in which the subject of the University and its curricula for engineers was under discussion, proved unusually helpful. As the meeting was a joint affair composed of the five national engineering societies, discussion was entered into from many interesting angles. The following delivered papers as leading features in the symposium: John A. Britton, Professor C. L. Cory, Professor C. D. Marx, J. W. Beckman and T. A. Rickard.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers
President—Comfort A. Adams, Harvard University.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section
Chairman—J. H. Cunningham, General Electric Co., Los Angeles.
Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
Meetings—Second Tuesday of each month.

Portland Section
Chairman—R. M. Boykin, care North Coast Power Co., 441 Pittock Block, Portland, Ore.
Secretary—W. D. Scott, Pacific Telephone & Telegraph Co., Portland, Ore.
Meetings—Monthly.

Denver Section
Chairman—Fred J. Rankin, Colorado Pub. Utilities Com., Denver.
Secretary—Robt. B. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings—Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p.m., followed by regular meeting.

San Francisco Section
Chairman—J. C. Clark, Stanford University, Cal.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section
Chairman—John Harisberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—T. C. Smith, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section
Chairman—George Nixon, Main and Lincoln Sts., Spokane.
Secretary—G. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
Meetings—Third Friday of each month.

Utah Section
Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 133 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section
Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch
Chairman—A. J. Swank, University of California, Berkeley, Cal.
Secretary—G. F. Teale, University of California, Berkeley, Cal.

University of Colorado Branch
Chairman—Albert S. Anderson, Boulder.
Secretary—Terril C. Smith, University of Colorado, Boulder.
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch
Chairman—V. Pearson, Moscow, Idaho.
Secretary—L. J. Corbett, University of Idaho, Moscow, Idaho.
Meetings—First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch
Chairman—J. A. Hooper, Oregon Agr. College, Corvallis, Ore.
Secretary—L. Happold, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch
Chairman—C. H. Suydam, Stanford University.
Secretary—Frank Miller, Stanford University.

Montana State College Branch
Chairman—Roy C. Hagen, Montana State College, Bozeman, Mont.
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Colorado State Agricultural College
Chairman—R. C. Richards.
Secretary—W. A. Stallings, Colorado State Agricultural College, Fort Collins, Colo.

Throop College of Technology Branch
Chairman—J. Paul Youtz, Throop Dormitory, Pasadena, Cal.
Secretary—Clark E. Baker, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch
Chairman—Clarence E. Guse, Pullman.
Secretary—Ralph C. Guse, State College of Washington, Pullman.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers
Chairman—W. Creighton Peet.
Secretary—W. H. Morton, 110 West 40th St., New York.
Executive Committeemen-at-Large—W. D. Kohlwey, California; Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland, J. F. NePage, Seattle, Wash.

British Columbia Ass'n Electrical Contractors and Dealers
President—E. Brettell, Vancouver, B. C.
Secretary—Capt. W. J. Conway, Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers
President—M. A. De Lew, 180 Jessie St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Electrical Contractors and Dealers Ass'n of San Francisco
President—C. L. Chamblin, 641 Mission St., San Francisco.
Secretary—J. Stewart, San Francisco.
Meetings—Monday, 12:15; Jules Sutter Cafe.

Southern California Electrical Contractors and Dealers
President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers
President—W. Cox, Santa Cruz.
Secretary—J. A. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers
President—F. V. McAvoy, 138 N. Canter St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon Ass'n of Electrical Contractors and Dealers
President—R. C. Kenney, Portland.
Secretary—J. Willis Oberender, 301-2 Dekum Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers
President—J. H. Sroufe, Jaggar-Sroufe Co., Portland.

Sacramento Section, California Electrical Contractors & Dealers' Association
President—W. H. Gribble, Sacramento.
Secretary—H. Berg, Sacramento.

Utah Society of Electrical Contractors and Dealers
President—J. V. Buckle, Buckle Electrical Co., 70 E. 1st St., Salt Lake City.
Secretary—E. H. Eardley, Eardley Bros. Co., 37 E. 1st St., Salt Lake City.
Meetings—Every Friday noon at Commercial Club.

Washington Ass'n of Electrical Contractors and Dealers
President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary—Forrest E. Smith, Seattle, Wash.
Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers
President—W. S. Berry, Western Electric Company, San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast
President—C. L. Gilson, Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST

California Electrical Cooperative Campaign
Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

National Electric Light Association
President—W. F. Wells, Edison Elec. Illuminating Co., Brooklyn.
Executive Secretary—T. C. Martin, 33 W. 39th St., New York City.

Nevada Section, N. E. L. A.
Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.
President—Samuel Kahn, Western States Gas & Electric Co., Stockton, Cal.
Secretary—A. H. Halloran, Journal of Electricity, Crossley Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.
Chairman — H. H. Schoolfield, Pacific Power & Light Co., Portland.
Secretary — F. H. Murphy, Portland Railway, Light & Power Company.

Illuminating Engineering Society
President—George A. Hoadley.
Secretary—Clarence L. Law.
Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.
Meetings—First Tuesday each month.

New Mexico Electrical Association
President—James R. Smith, Raton, N. M.
Secretary—Charles Twogood, Albuquerque, N.M.
Meetings—Annually, in February.

Southwestern Electric and Gas Association
President—W. A. Sullivan, Shreveport, La.
Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n
President—H. J. Gille, Puget Sound Traction Light & Power Co.
Secretary—W. E. Herring, Puget Sound Traction, Light & Power Co.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.
New officers announced later.

Los Angeles Jovian Electrical League
President—A. E. Peat, San Joaquin Light & Power Corp.
Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.
Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League
President—Garnett Young, 612 Howard St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association
President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary—A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 60 days.

Alameda County Electrical Club
President—George Drew, Pacific States Electric Company, Oakland, Cal.
Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club
Secretary—H. N. Beecher, City Hall, L. A.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
President—W. H. Brammage, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dodson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS

National Officers
President—Mortimer E. Cooley, Electrical Engineering Dept., AnnArbor, Mich.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.
President—E. C. Jones, Pacific Gas & Electric Co., San Francisco.
Secretary—Geo. L. Hurst, Bethlehem Ship Bldg. Corp., Ltd., San Francisco.
Meetings—Quarterly.
Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.
President—Charles H. McGuire.
Secretary—T. J. Royer.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
President—Orrin E. Stanley, Box 973, Portland, Ore.
Secretary—C. J. Hogue, Box 973, Portland, Ore.
Meetings — Annual: Feb. 4, 1918. Monthly: Third Thursday of each month.

The Engineers' Club of Seattle
President—H. E. Horrocks, Seattle, Wash.
Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco
President—A. E. Chandler, New Call Bldg., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.
Annual Meeting: October.

Idaho Society of Engineers
President — W. H. Gibson, Mountain Home, Idaho.
Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland
President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento
President — George S. Nickerson, 914 Forum Bldg., Sacramento.
Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

United Engineering Societies of San Francisco
Chairman—C. D. Marx, Stanford University.
Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.
Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual.

Portland Section A. S. C. E.
President—P. H. Dater, Eng. U. S. Forestry Service.
Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.
Meetings—At call of president.

Spokane Engineering & Technical Ass'n
President—J. C. Ralston, E. M., E. E.
Secretary—A. D. Butler, City Engineer, Spokane, Wash.
Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

Foreign Trade Club
President—W. H. Hammer, Monadnock Bldg.
Secretary—Wm. E. Hague, Monadnock Bldg.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association
President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education
Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

HAPPENINGS IN THE INDUSTRY

WASHINGTON CAR FARE BILL PASSES SENATE

Carrying an emergency clause, amended Senate bill No. 18, for the relief of street railway companies, has passed the Washington state senate by a vote of 29 to 11. The broad purpose of the bill is to enable the public service commission to set aside the five cent minimum street car fare now provided in the act creating the public service commission and "raise or lower" fares upon a showing by the company, and after public hearing has been held at which all parties in interest are heard. The original senate bill came to the senate with the name of Senator Phipps of Spokane as sponsor. It was drawn by the corporation counsel of Spokane and had the support of the municipal administration of that city, also of Tacoma. Primarily it sought to remove the privately owned street railway companies from the jurisdiction of the public service commission and return the control of such utilities to the city council, empowering the council to increase fares by ordinance. At the public hearing on the bill the representatives of the competing Spokane street car companies opposed the Phipps measure as drawn and offered the amendments that were subsequently written into the amended bill. The act will not affect Seattle if the deal for the purchase by the municipality of the street railway system is consummated, because under the public service commission act, municipally-owned utilities do not come under the supervision of the state commission.

PLANT FOR SEMI-DIESEL ENGINES

The Gulowsen-Grei Engine Company of Christiania, Norway, has just completed a plant at Seattle at a cost of approximately $700,000 for the manufacture of semi-Diesel engines on a large scale. The aggregate capacity is 15,000 to 20,000 horsepower per annum. The plant occupies about six acres and is situated on Lake Washington ship canal in the Salmon Bay district. Engines are similar to those made in Norway by this concern, consisting of the surface ignition design, used largely for marine duty, also suitable for operating mills and pumps. At the new plant various sizes will be made ranging from 15 to 360 h.p. Each engine is to be equipped with a small electric generator for charging storage battery to start the engine. The pattern shop, foundry and machine shop and erecting floor, each occupying a separate building, are all equipped with electrically operated machines and tools, requiring about 40 motors and connected load of about 600 h.p. at 440 volts, three-phase. The cost of wiring the buildings for power and lighting was approximately $25,000. Electric wiring and installation of motors were handled by the Standard Electric Company of Seattle.

EVENING CLASSES IN TECHNICAL SUBJECTS

The Board of Education of San Francisco maintains as a part of its public school system in the technical department of the Humboldt Evening High School at 18th and Dolores streets, free instruction in mechanical, civil, structural, marine, automobile and electrical engineering, naval architecture, architecture and building construction, mechanical drawing, sheet metal pattern drafting, surveying, steel square, strength of materials, estimating quantities and costs, slide rule, and all mathematical subjects. For linemen, cable splicers, inside wiremen, armature winders, telephone main-

tainers, storage battery men, wireless construction men, automobile ignition men, and marine electrical workers, switchboard operators and meter men, special instruction is given in sketching and detailing electrical machinery and apparatus, making diagrams of connection for dynamos, motors, transformers and controlling equipment; making plans for electric light distributing systems and street railway controller systems; laying out motor drives for factories and power houses and making diagrams of telephone and telegraph circuits. With this work special instruction is given in physics and theoretical electricity, including direct and alternating currents and wireless transmission of signals.

Although students may enter this school at any time and do efficient work, it is desirable that they enter as near the beginning of the new term on February 10, 1919, as possible.

NEW IRON WORKS IN CHINA

Announcement is made of the establishment of a new company to be known as the Peiyang Iron Works, organized for the purpose of working the mines in Chihli province. The company is capitalized at $4,000,000, of which the Chinese government will supply one-fourth, the civil governor of the province one-fourth, and merchants the remainder. The iron works will be established at Hsuanhuahsien.

It is understood also that plans are under way in the province of Anhui for the establishment of an iron foundry, to be called the Hua Chang Iron Foundry, for which a million dollars has already been raised. The office of the company will be at Penpu.

OIL BILL IN CALIFORNIA LEGISLATURE

The following statement is issued by the California State Mining Bureau:

The various industries and the people of California are almost entirely dependent upon petroleum for power and fuel. They must be assured that all possible precautions conducive to a stable and long continued supply are being taken. The question of whether or not their interests in this regard are to be protected is now definitely before the legislature.

A bill introduced by Senator Thompson and Assemblyman Argabrite provides for serving the public interest and that of all the industries dependent upon oil, either through its consumption or production. The bill is based upon the results of the intimate study and investigation made by the State Mining Bureau in the oil fields during the past four years, and combines all the best features developed during the enforcement of the present law. It provides regulations requiring that all oil wells, even those belonging to powerful, but careless, concerns, shall be drilled and maintained in such a manner that the oil deposits will not be ruined merely to obtain quick profits to a short-sighted operator.

The interests of oil operators are safeguarded through sure and speedy action of the superior courts by injunction proceedings against possible error or abuse of power by the state officers. No change in the present general policy of cooperating with and providing for the interests of oil operators is contemplated.

Certain oil producing concerns who have never recognized that the public is vitally interested in the preservation of the oil fields, and have always opposed adequate state supervision, have introduced other bills. Realizing that absolute repeal of a conservation measure would not meet with public approval, their ultimate object is concealed by provisions which would leave merely the skeleton of an impotent law on the statute books. In order to allow no possibility that even a skeleton law might be operative, they further propose to put the enforcement of the law into the hands of a few large oil producers.

BANKING IN THE FAR EAST

Typical of the continual news coming from abroad concerning the ever increasing engineering and commercial relations with the Orient is the recent announcement that the Asia Banking Corporation, a subsidiary of the Guaranty Trust Company of New York City, has opened its Shanghai office and that this corporation expects to branch out at Hankow about the middle of March, and at Tientsin and Peking some time early in May.

U. S. DEPARTMENT OF LABOR ENCOURAGES PUBLIC WORKS

A new division has been created in the Department of Labor for the purpose of interesting the nation in public works and private construction. The division which will carry on this work is now being organized by F. T. Miller, the publisher of construction periodicals. It is called the Division of Public Works and Construction Development, and occupies the building at 16 Jackson Place.

The particular objective of the bureau's research will be to secure data for the use of the construction industry, but the material to be collected will be so varied that the information will be of value to industry generally. The facts made available will be of help to any community or investor in determining whether it is advisable to undertake public or private building at present. When circumstances unfavorable to construction are discovered an attempt may be made to correct them, but there will be no stimulation of economically unsound enterprise.

The inquiry will be under the direction of business men of wide practical experience who are serving without pay. The actual investigation will be conducted by a group of economists and special agents supplied by the Department of Labor and other Government departments or lent by universities. The field will include the cost and supply of building materials, the amount of labor available and its cost, the values of land, prevailing rents, the supply of capital, the amount of construction held up by the war and the demand for building in all parts of the country.

HIGH WATER IN THE NORTHWEST

The following report comes from Chehalis, Wash., dated January 22. The rain was general throughout the Northwest:

Last night and all day the heaviest downpour of rain in the memory of the oldest inhabitants has prevailed in this section. Already the Chehalis and Newaukum valleys are flooded for miles, and by tomorrow record breaking high water is more than likely, even if further slides do not add to the trouble. Today trees carried down the hill north of town by two great landslides buried the street car tracks and carried down the power lines, leaving Chehalis, Centralia and Tenino without light or electric power. Late in the afternoon, however, light service was resumed. In North Chehalis, near the power company barn, a foot of water is pouring over the Pacific highway, coming down Coal creek valley as never before. The general opinion is that the damage done by this flood will be the worst for years.

INVESTIGATION BY JAPANESE GOVERNMENT

The necessity of the accurate measurement and record of the flow water in rivers was keenly felt when the war enhanced the growth of electro-chemical industry in Japan. Prompted by this necessity the Department of Communications has arranged to measure and record all the principal rivers in Japan. The empire island is divided into twenty-two surveying sections and all the rivers promising more than 1000 horsepower are to be recorded. The same measure was taken several years ago with the aim of selecting the rivers for electric light and power industry. Necessary data on the available power for electro-chemical purposes have been lacking which are to be obtained this time. The survey began last July and is now being carried out.

REPORT OF CALIFORNIA RAILROAD COMMISSION

The California Railroad Commission summarizes its year's work in a report recently presented to the governor of the state. "Increases in cost came so rapidly," it declares in defense of its war policy of increasing utility rates, "that it would have been impossible for the Commission to give the necessary prompt relief if attempt had been made to have detailed valuations under normal conditions. The factor of time forbade the remedy which a less comprehensive study would show was needed. The Commission had no hesitancy in allowing such increases as it deemed proper and reasonable. It believes it fully discharged its duty not only to the public, but to the utilities and National Government by allowing increases to enable the utilities to function efficiently and to prevent financial disaster."

The abnormally low rainfall following two unusually dry winters intensified the problems of the utilities, according to the Commission, which continues:

"That the effect of public regulation was of the greatest possible benefit to the utilities themselves during this period (a period that might well be considered the acid test of the efficiency of regulation) is evidenced by the fact that during that period not a public utility in the State of California went into bankruptcy or receivership."

Referring to Federal control of railroads and telegraph and telephone companies, the Commissioners say:

"Contrary to widespread belief, Federal control of interstate railroads has not appreciably diminished the work of the Commission. Unless Federal railroad control continues permanently there will be very little release from related duties. The Director-General of Railroads has asked the Commission repeatedly to perform services and to make recommendations on vital California problems, such as new construction projects in California."

The report then goes on to show what the people of California pay for utility service and gives the following statistics:

In 1917 the water, gas, electric, telephone and telegraph companies and steam and electric railways collected in the form of rates the sum of $516,663,789.17, as compared with $451,389,520.15 in 1916. The net operating revenues of the same utilities in 1917 were $178,071,844.40, as against $166,102,672.45 in 1916, an increase of $11,969,171.95. Electric light companies in 1917 reported net operating revenues of $16,123,663.47, in 1916 $16,281,693.55.

Despite war conditions, California utilities during the fiscal year ending June 30, 1917, expended in extensions and improvements a sum exceeding one-half the amount expended by the same utilities in the four years 1913 to 1916, inclusive. The electrical companies spent 65 per cent as much in 1917 as they did in the preceding four years. The telephone companies expended about 40 per cent.

TRADE NOTES

Personal Items —

C. E. Ingalls, who has for some months past assumed a joint western managership for the Crocker-Wheeler Company, with headquarters in San Francisco, has with the beginning of the year taken over the entire running of this agency. During the comparatively brief period in which Mr. Ingalls has been identified with the industry in the West he has proved not only an able representative for his firm but he has become actively engaged in practically all the electrical activities in this district, including membership in the San Francisco Electrical Development League, the San Francisco Engineers' Club, and the Pacific Coast Section, N. E. L. A.

Paul A. Shilton of Los Angeles, manager for R. J. Davis, district sales agent for Century A.C. Motors and Fans, will visit all the cities of Arizona during the month of March. **Arthur M. Funke** of San Francisco, representing the same company, has been visiting the trade located in the San Joaquin and Sacramento valleys.

Richard Chamberlin, representing the Hurley Machine Company, making his headquarters in Seattle, has just returned from a visit to the factory in Chicago.

Lieutenant C. H. Tallant, formerly advertising manager for Western Engineering and before that in charge of the General Electric Company's publicity at San Francsico, has received his honorable discharge from the army and now is advertising manager for the Pelton Water Wheel Company at San Francisco.

F. W. Milligan, president of the General Porcelain Company of Parkersburg, West Virginia, is visiting the Pacific Coast.

H. E. Sanderson, Pacific Coast manager of the Bryant Electric Company, and **Garnett Young,** general manager of the Garnett Young Company, have returned to their San Francisco headquarters from a tour of the southern district of California.

S. W. Peterson, of the Stubbs Electric Company of Portland, and **C. M. Will** of the Fobes Supply Company of Portland, are San Francisco visitors and have been in attendance at the recent Del Monte convention of the Electrical Supply Jobbers' Association.

A. L. McLeod, manager of the Jeffrey-Dewitt Insulator Company of Huntington, West Virginia, has returned east after visiting Pacific Coast points.

F. H. Murray, formerly sales manager of the National Carbon Company in San Francisco, has moved to Los Angeles where he takes the position of district salesmanager of the company's office there. Mr. Murray was originally connected with the Los Angeles branch, to which he now returns.

C. O. Martin has just been discharged from the aviation department of the government service and is representing the Benjamin Electric Manufacturing Company of Chicago, with headquarters at Seattle.

A. Turnbull, previous to the war connected with the heating device department of the General Electric Company, has been released from the aviation department of the service and is now representing the Edison Electric Appliance Company in the Northwest, with headquarters at Portland.

Changes and Beginnings

W. C. Little has opened an electrical supply shop in Porterville, Cal., recently.

It is reported that the electrical supply store of R. E. Fredericks in Sebastopol, Cal., has been sold to J. L. Bone.

The National Electrical Corporation was recently incorporated in San Francisco.

The Calistoga Electric Company of San Francisco has recently applied for dissolution.

C. Shermund has sold his interest in the Acme Electric Company, of San Francisco, to L. A. MacLean.

The Standard Light Control Company of San Francisco has been incorporated for $250,000, shares $100 each. The incorporators are: E. J. Henderson, Edw. F. Dowd, R. W. Ebeling, L. E. Voger and L. D. Manning.

Tyrell & Ellison have rented the Fortier building on Walnut street, Red Bluff, Cal., starting as an electrical contractor-dealer establishment.

Pacific Coast Representative —

Baker-Joslyn Company of San Francisco, Los Angeles and Seattle, have been appointed sales representatives of the Jeffery-Dewitt Insulator Company of Huntington, West Virginia, manufacturers of high-grade high-tension insulators. A complete stock of J-D suspension insulators and accessories will be carried at all three warehouses for the convenience of Western users.

Canadian Factory —

Davis Slate & Manufacturing Company of Chicago have just completed arrangements for the equipment of a thoroughly modern slate factory at Toronto, Canada, which will enable them to better serve their constantly increasing number of customers in the Dominion. Mr. A. H. Winter Joyner of 100 Wellington street, Toronto, has been appointed Canadian sales manager, and Mr. William Wright of Toronto as superintendent of production.

A Golf Trophy —

The electrical fraternity in Los Angeles have established the custom of playing golf every Thursday afternoon. The Rome Wire Company of Rome, N. Y., recently presented a beautiful Copper Cup as a trophy to be played for on these occasions.

LATEST IN EVERYTHING ELECTRICAL

(The single geared V-grooved type of elevator has not been used to any extent in this country for high speed passenger service. A description of a recent installation of this type in which a very even rate of acceleration and retardation is secured through the use of a special control is here given, together with brief notes on a new switch especially designed for marine service, a prepayment electric meter and a new device to determine without inconvenience the class of current at a specified outlet, whether a.c. or d.c. and whether the voltage is 110 or 220. —The Editor.)

BRYANT SNAP SWITCH FOR MARINE SERVICE

The snap switch here illustrated is one of the devices of the Bryant complete line for marine purposes. The base is of unbreakable moulded composition with the rachet plates moulded in. The form of construction eliminates the liability of mechanism becoming loose, which is almost certain to occur in other forms of construction.

While this rachet plate must necessarily be made of steel, in order to withstand the severe service expected of such a part, it is heavily copper-plated to prevent rusting. The music wire spring which actuates the mechanism is also heavily copper-plated.

This switch is made in both single pole and double pole, and for either type, a ⅜ in. extension stem for handle is offered for use where water-tight covers are employed. The bases are moulded of such a size as to permit of standard screw spacings for attaching to the box, i. e., 1⅜ in. on centers. The diameter of the switch base is 1¾ in. The height to the top center base proper is 1⅝ in.

As will be noted from the illustration a groove is provided on the back of the base which is large enough to permit of running a separate circuit through the box.

Two of these switches may be mounted in a standard four-inch box.

PREPAYMENT WATTHOUR METERS

The General Electric Company has developed a prepayment watthour meter called the Type I P-5 for use on a.c. circuits. Electrically, it is the standardized Type I-14 G-E watthour meter. The prepayment device, which is an integral part of the meter, is mechanically operated.

The purpose of this prepayment meter is to make more profitable the accounts of small consumers and of the shifting population of today by lowering the costs for collection and to eliminate the uncollectable accounts from these sources. By also eliminating flat rates to these classes of customers, consumption of electrical energy and consequently of fuel is reduced, and the apparatus investment can be governed by actual requirements of essential operations. In addition, the central station is saved the trouble and expense of cutting service in and out because equipment is undisturbed.

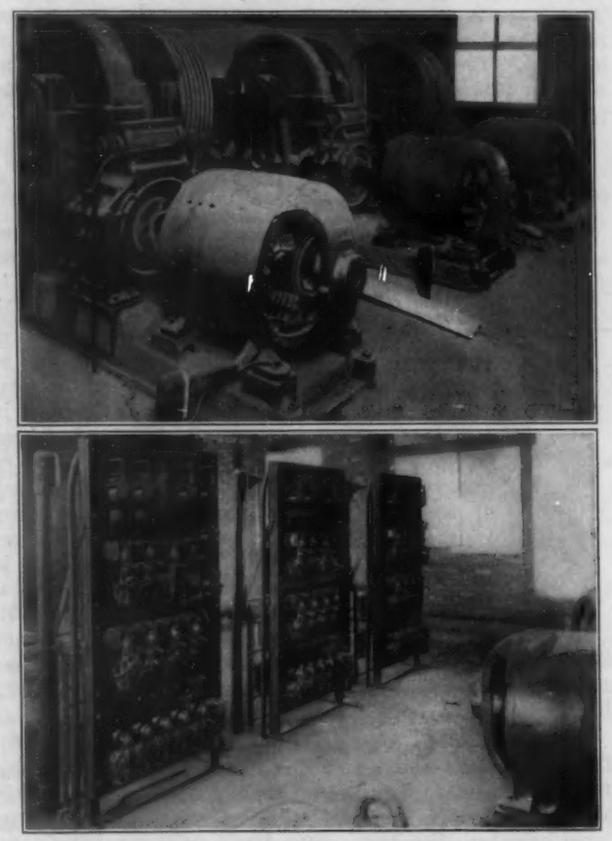
The prepayment mechanism is actuated by a large coiled spring wound when depositing the coin. The only load imposed on the driving element of the meter is that of actuating the tripping device. This requires practically no energy.

The insertion of the first coin and turning of the knob automatically closes the controlling switch. (Twenty coins is the maximum for deposit though the coin box will hold about one hundred.) When energy to the value of the deposit has been recorded the switch is automatically opened until another coin has been deposited. Every precaution has been taken against tampering or beating the meter. Opening it for inspection does not make the cash box accessible except to those having the special key. The rate of charge can be changed by inserting a new set of rate gears.

ELECTRIC ELEVATOR EQUIPMENT

The new Milwaukee Athletic Club Building which was opened to its members during the past summer, is one of the most modern and completely equipped club buildings of its kind. The new clubhouse stands on a plot of ground 120 by 120 feet. It is composed of twelve stories and is 175 ft. in height, being constructed wholly of steel, concrete and cement.

Among the many conveniences installed in the building are three high-speed passenger elevators, and a similar one called a service elevator and one slow-speed freight elevator.



Single gear V-groove traction type elevator machines and motors shown above. Below is shown the automatic controller for each motor.

The type of elevator machine installed is single gear V groove traction, which has not been extensively used in this country until just recently—although a number have been built for export business. The accompanying illustration shows the three elevator machines used for passenger service together with the motors and C-H automatic controllers. The machines were built by the Haughton Elevator Company of Toledo, O. The motors are 35 h.p. 230 volt, 250 to 750 r.p.m. shunt wound, made by Roth Brothers & Company of Chicago, and built in accordance with a combined design of the Roth Brothers Company and the Cutler-Hammer Manufacturing Company, the latter company also furnishing the controllers.

From the specifications of the motor given above, it can be seen that there is a 3 to 1 speed control which is accomplished by shunt field weakening, which gives an economical running condition with each speed except slow-down, and this is used only in making landings. There are three speeds that can be secured from the car switch.

The slow speed (45 to 50 ft. per minute) corresponds to the motor speed with full field and a resistance in series with the armature, and a resistance shunt across the armature. The normal speed (150 ft. per minute) is secured with all of the armature resistance cut out and with the armature shunt open circuited. The high speed (450 ft. per minute) corresponds to the motor speed with field weakening.

A noticeable feature in the operation of the elevator is the uniform rate of the acceleration and retardation, secured through the controllers, which may be briefly described as follows:

Each controller has a single pole magnetic type service switch which remains closed during the hours the elevator is in service. By means of a pilot switch in the car the service switch may be opened when the elevator equipment is to be shut down for any appreciable period, thus disconnecting the motor entirely from the line and eliminating power consumption in the shunt field which occurs as long as the elevator is in service. The two middle panels of each controller carry a double pole magnetic main switch and two double pole reversing switches, also control fuses with metal covers and a try-out switch. By means of the try-out switch the car may be operated from the switchboard without the use of an operator. The lower panel contains the armature accelerating switches which consist of a magnet relay retarded by an air dash-pot and five magnetic accelerating switches. The slow-down is accomplished by means of two switches, one of which is spring closed and which connects a resistance across the motor armature at the same time the armature accelerating resistance is inserted. After this initial dynamic braking has died down, the second switch, which is a magnetic lock-out switch, closes, thus giving another inrush of current and slowing down the car still more. A single pole magnetic switch is also provided to give full field strength to the motor during the dynamic braking period. The field control consists of four single pole spring-closed contactors which open in succession and which insert resistance in the shunt field circuit. A double coil overload relay is also provided on the top panel, which may be reset by moving the car switch to the neutral position.

MAJESTIC DETERMINATOR

Doubt always causes loss. In every case of doubt, there is a loss of time and in most cases of doubt, the loss of time is accompanied by a more or less serious loss of money.

The foregoing applies with more force to electrical work than to any other, as most of the expensive and dangerous burnouts are caused by doubt—doubt as to whether the current is a.c. or d.c.

To end this state of affairs, the Majestic Determinator was called into being. It puts an end to doubt; it instantly determines the class of current at a specified outlet, and at the same time shows whether the voltage is 110 or 220.

When motors, transformers, or any instrument operated by electricity are to be installed, the first thing necessary is to find out what class of current the building is supplied with. Until the Majestic Determinator was invented, there were but two ways to find this out: First, by "feeling the juice," which should never be done as it is always extremely dangerous. Second, by asking the central station, which puts them to considerable trouble and places an unnecessary responsibility upon their shoulders which they are not willing to assume. This method is uncertain, as the central station may be supplying that particular building with both alternating and direct currents.

The Majestic Determinator is an instrument as simple in operation as it is certain. To operate it, all that is necessary is to place the plugs to the wires or terminals, press the button at the bottom of the determinator, and if the current is direct the letters d.c. will instantly appear within one of the circles at the top of the determinator; if the current is alternating, the letters a.c. will appear within the other circle. The brilliancy of the light back of the letters a.c. or d.c. tells whether the voltage is 110 or 220.

The plugs attached to the determinator are knife blade type and are so constructed as to render short circuits or shocks impossible.

With the Majestic Determinator, all open fuses and circuit breaks may be accurately determined. Broken wires or coils, as well as bell and lighting circuits, may be accurately tested with this instrument. It is designed for the use of every wirer, every trouble shooter, every electrical engineer, every superintendent of buildings, or in fact every one having anything to do with electricity.

The Majestic Determinator is 4 inches long, 2 inches high and 1½ inches wide, and weighs 7 ounces.

The Majestic Determinator is being manufactured and marketed by the Majestic Electric Development Company, 656-658 Howard street, San Francisco.

BOOKS AND BULLETINS

Bureau of Standards Pamphlets

The removal of Toluol, benzol and other light oils from gas is considered in Technological Paper No. 117 of the Bureau of Standards, entitled "Toluol Recovery." The authors are R. S. McBride, C. E. Reinecker and W. A. Dunkley, all of the Bureau of Standards.

A new publication covers the subject "Electrolysis and Its Mitigation." We find in this revised edition a rather full discussion of the three-wire method of railway power distribution. The section on pipe drainage has been modified and a paragraph on automatic substations added.

A New Book on Municipal Ownership

One of the most interesting volumes on the subject of municipal ownership which has so far appeared is that entitled "The Results of Municipal Electric Lighting in Massachusetts," written by Professor Edmond Earle Lincoln of Harvard University. This work won the $1,000 cash prize for the year ended June 1, 1917, offered by Messrs. Hart, Schaffner & Marx for studies of economic and commercial subjects. It appears that Professor Lincoln selected the state of Massachusetts for a thoroughgoing study of public ownership compared with private ownership and operation. In this state he found a considerable number of municipal plants which have been operated for a long time. Massachusetts also is the state which was the pioneer in the regulation of public utilities by a state commission, and in which the largest amount of data has been recorded over the longest period. In the first chapter of the volume the author reviews practically all of the important literature on public ownership which has appeared in the United States, finding that very little of a really thorough and conclusive nature has been developed. No one who reads the book can fail to be impressed with the honesty of Professor Lincoln's investigation and his impartial attitude. His general statements are backed up by a great mass of carefully presented statistics and his conclusions are given in the final chapter. These conclusions are generally in favor of the private ownership and operation of electric lighting plants under adequate public regulation, when progressively conducted. He says:

"Business now carried to a reasonable degree of perfection by the public powers will, if retained in public hands, be in danger of rapid

stagnation. Whatever the sequel may be, this modest study, as well as most careful and unbiased investigations, points to the conclusion that as a rule only the simplest and the 'well-seasoned' enterprises are at all suitable for public operation; and even these are in grave danger of becoming less efficient than they would be in private hands. Though political expediency or social necessity may sometimes momentarily outweigh all economic considerations, it still seems inherent in the nature of things that private industry must continue to show the way."

Fixture Bulletin

A general bulletin covering wall and desk fixtures suitable for the display of advertising copy, map and tack systems, pictures, plans, posters, hardware and small supplies and the like has been issued by the Universal Fixture Company of New York.

Miniature Eye Comfort

A neat little miniature reproduction of their folder magazine "Eye Comfort" has been issued by the National X-ray Reflector Company to suggest to its readers the advantages to be obtained from the larger book.

Mining Bulletins

The Bureau of Mines, Department of the Interior, has just issued the first of a series of bulletins containing the mining statutes of different states under the title of Bulletin 161, "California Mining Statutes Annotated," by J. W. Thompson. The purpose of this bulletin and others of like nature which are to follow is to point out the laws and regulations best adapted to increase safety and efficiency in the mineral industry of the United States and to aid legislative bodies in framing uniform mining laws. The State of California, by reason of its historic interest in mining and by reason of its great extent of mineral land and its vast mineral deposits, has been selected for the first bulletin of the state series.

Illuminating Engineering

National X-Ray Reflector Company has just published a new book on illuminating engineering entitled "Lighting from Concealed Sources." This is a 250 page volume, 8 x 10 in., containing 500 illustrations to amplify the facts stated in the text. It has a stiff buckram binding so as to preserve it for permanent use. Copies will be sent to interested engineers and architects upon application to F. S. Mills, resident engineer, 742 Market street, San Francisco. Another text on Office Lighting is a recent addition to the valuable series of lighting books distributed by the company.

Historical Review of Steam Turbine Progress

The Westinghouse Electric and Manufacturing Company has just issued their Circular 1591, subjected "An Historical Review of Steam Progress." This publication was written by Francis Hodgkinson and is a reprint of an article which appeared serially and is now gathered together in one publication with the intention of becoming a handbook on steam turbine progress. The early history of steam turbine engineering is gone into and the earlier machines installed in America are illustrated. From 1899 until 1917, each year's development is properly recorded as it occurred and the improvements noted. The booklet is profusely illustrated with views of all the different types of impulse and reaction turbines and the construction of blading, valve chamber, governor, throttle valve, coupling and oil cooler are shown in detail. This publication should be a valuable addition to designing and consulting engineers and is being used extensively in the government training classes for junior engineers on steam engineering work.

Uruguayan Construction

The American International Corporation has issued a bulletin describing the work on water works and sewerage systems in Uruguay and other construction in which the organization is interested. The booklet is attractively illustrated and gives a comprehensive idea of the nature of these enterprises and the conditions under which they are carried out.

Hydro-Electric Power Commission of Ontario

Two most valuable reports are available from the Hydroelectric Power Commission of Ontario, as the result of experiments and investigations made during the last year. A report on "The Rate of Coal Consumption in Various Electric Generating Stations and Industrial Establishments in Canada and the United States" gives comparative figures for various types of central stations, together with useful charts and much supplementary data of interest. The report on "The Heating of Houses—Electricity and Coal Compared" is designed to discourage the view commonly held by the public, that electricity is a possible source of heat for general use. As is there pointed out, the cost of electric heating at prevailing rates would be some four times that of coal, there is no summer demand sufficient to utilize the current which would be released during that season, and the six million h.p. which represents the estimated total possible development of Ontario water power is not sufficient to supply the existing homes of Ontario for heating alone, exclusive of other requirements.

Western Electric Year Book

The Western Electric Company have issued their year book for 1919, listing manufactures and material carried, together with brief descriptions and price lists. The book is 1120 pages long, is profusely illustrated and is bound in neat gray board covers.

Electricity and Magnetism for Engineers

Part I, Electric and Magnetic Circuits

by Harold Pender, Ph. D., Professor-in-Charge, Electrical Engineering Department, University of Pennsylvania, Vice-President and Fellow, A. I. E. E.; size 6 x 9 in.; 380 pp.; published by the McGraw-Hill Book Company, Inc., New York, and for sale by the Technical Book Shop, San Francisco. Price $3.00.

The fundamental laws of electric and magnetic phenomena and their application to some of the concrete problems in the generation, transmission and utilization of electric energy as they are met with by the engineer are taken up in this volume. The book is intended as a text book for engineering students or a review text for those away from daily contact with the subject who may wish to refresh their memories. Particular emphasis is laid upon exact quantitative statements of the laws and principles with a view to the needs of the engineer who is often annoyed by an inability to use the simple formulas as commonly given, owing to the failure in many text books to state their exact limitations. The book is excellent as an advanced text and presupposes a knowledge of mathematics and a general familiarity with engineering subjects. For convenience the work has been divided into two parts, the first dealing with "Electric and Magnetic Circuits" and serving as a preparation for the study of direct current machinery, and the second with "Electrostatics and Alternating Currents." The present volume is part I of the series.

Topographic Stadia Surveying

by C. E. Grunsky, Eng. D. A manual with reduction tables and a new type of reduction diagram. Size 4½ by 7½ in.; 100 pp.; 18 illustrations and a folding plate; pliable binding. Published by D. Van Nostrand Company and for sale at the Technical Book Shop, 171-3 Second St., San Francisco. Price $2.00.

To those engineers who must deal largely with the collection of topographic data this little manual will be found unusually useful. The method of surveying that is made the basis of the diagram for computation in the reduction of stadia notes has been found of great value to the author and others who have tried them. The author is himself an engineer of wide experience and one well known to the profession. The book is divided into nine subdivisions of text and includes in addition the stadia diagram in cover pocket. It begins with the development of the telescope for stadia reading, discusses the various formulas in usé for stadia computation and ends with practical hints for the platting of stadia notes.

NEW ELECTRICAL DEVELOPMENTS

(Various bills before the legislature in the Northwest are of special interest to the electrical industry. In the Pacific Central District various increases in rates have been allowed by the Railroad Commission, and a reservoir as part of the Hetch Hetchy system is to be built in San Francisco. Considerable activity along electrical lines is reported from irrigation districts and elsewhere throughout the Southwest and Intermountain Districts.—The Editor.)

THE PACIFIC NORTHWEST

TACOMA, WASH.—City officials have reduced street car fare in the city from seven to five cents.

PILOT ROCK, WASH.—The city has secured a plot of ground 50 x 80 feet for the erection of a light plant.

TACOMA, WASH.—The Tacoma Railway & Power Company has paid into the treasury of this city the sum of $17,269.96 as its gross earnings tax for 1918.

SEATTLE, WASH.—Corporation counsel is drawing a bill to be presented to the legislature that has for its object the securing of permission by the city to go into the jitney business, to be operated in conjunction with municipal street railway lines.

SOUTH BELLINGHAM, WASH.—E. K. Wood Lumber Company of South Bellingham will install a 220 kva. Allis-Chalmers synchronous motor. This motor, in addition to driving three planers, will serve to correct the power factor of the plant.

ESTACADA, ORE.—The high water caused 50 feet of flume, which extends from the dam to the power house of the Portland Light and Power Company's power plant, to go out at Cazadero. By working night and day the repairs were completed promptly, however.

FAIRBANKS, ALASKA.—Fairbanks and Nenana will cooperate in the movement to secure a government-owned hydroelectric plant in the Tanana Valley to provide power to miners and those engaged in other industries. It is proposed to locate the plant on the Nenana.

ASTORIA, ORE.—A resolution has been passed by the Port of Astoria Commission requesting the Pacific Power & Light Company to provide immediate relief to the industries now appealing for electric energy with an adequate surplus to take care of whatever offers during the present.

SEATTLE, WASH.—Plans have been completed for the finishing of the interior of the Seventh avenue and Jefferson street power substation of the Puget Sound Traction, Light & Power Company, which was destroyed by fire November 10, 1918. All-new construction will be fireproof throughout.

SEATTLE, WASH.—Looking to the eventuality of the purchase by the city of the Rainier Valley street car system by Seattle, a bill has been introduced in the state legislature of Washington amending Chapter 59 of the state laws of 1917, giving cities the right to acquire and maintain street railways that extend beyond the corporate limits within a five-mile limit.

MARSHFIELD, ORE.—All street lights were out and no power could be furnished on Jan. 31st to the industrial plants, because of an accident at the Smith mill which made it impossible to furnish electric power. Until repairs were made, lights could be supplied only to residences and for the interior of business houses.

EVERETT, WASH.—This place is to be given a chance in the near future to vote on the question of establishing a municipal light and power plant. The city commission has been quietly planning for several months for development of power on the Sultan river. The first development would call for 6000 horsepower.

KASLO, B. C.—A new hydraulic plant and 2200 feet of pipe line are being installed at the property of the Gibson Mining Company, operating about 12 miles from this place. A. C. Britnall, formerly of the Washington Water Power Company, is installing the plant and equipment. The property is a silver-lead and zinc proposition.

ASTORIA, ORE.—The Port of Astoria has authorized the sale of an additional series of bonds totaling $750,000. The money is to be used in proposed extensions during the coming year. Among the improvements contemplated is an export and import pier and warehouse; additional power plant for the industrial growth of the city, etc.

PORTLAND, ORE.—As one of the final steps toward the termination of the receivership which has been in effect since June, 1917, foreclosure sales of the Home Telephone & Telegraph Company's property in Portland, Oregon City, Corvallis and Albany will be held at the court house February 17. The Pacific Telephone & Telegraph Company will bid $1,950,000 for the property.

PULLMAN, WASH.—Plans for the development of the electrical power from the waters of the Salmon river, 25 miles from Lewiston, were outlined before the Chamber of Commerce by F. S. Rice, who has secured water rights covering the horseshoe bend in the Salmon river and has secured government rights to tunnel through the bend and construct a dam to divert the flow of the water.

SALEM, ORE.—Plans for a $6,000,000 bond issue by the state of Oregon for the development of the water power of the Deschutes river and the creation of hydroelectric districts which may vote bonds and finance retirement of them when voted are the purposes of a joint resolution introduced recently in the lower house of the Oregon legislature. The resolution provides for the submission of an amendment to Article 19 of the state constitution.

SEATTLE, WASH.—Claiming that the development of the Skagit power project will require many years, Fred. W. Kelly has suggested, in a letter to the city council, that the city make use of the Swan Lake storage reservoir as a means of securing additional electric current quickly. This reservoir, as a part of an elaborate system of extensions planned in the city water system, will store a three months' supply of water. Kelly states that this impounded water can be profitably and economically used by the city to generate electricity.

KLAMATH FALLS, ORE.—A controversy between the California-Oregon Power Company and the water users of the Klamath Irrigation Project seems likely since the announcement by the corporation of its proposed dam across the head of Link river, at the outlet of the Upper Klamath Lake. The water users assert that their contract with the government when the Klamath project was launched, gave them the power rights as well as the water rights when they had paid up their water charges, and they claim that these are being infringed upon.

WENATCHEE, WASH.—Four and one-half feet of the steel pipe that carries the water from the Great Northern dam to its power house in the Tumwater canyon split recently, cutting off the power for the motors that haul the cars through the tunnel on the top of the hill and also putting out of commission all the Great Northern electric lights from Leavenworth to Tye. The pipe is 24 feet in circumference and when full the pressure is 80 pounds to the square inch. It is considerable of an engineering feat to mend such a break so that it will stand the continued pressure.

SEATTLE, WASH.—City Engineer A. H. Dimock estimates that the Skagit river power plant will cost not less than $30,000,000 when fully developed. The sum of $80,000 has already been spent in sinking test holes. He states that the recent borings at Gorge creek in an effort to find a suitable base for a concrete dam have not been as satisfactory as those first taken, the depth to bedrock being much greater than anticipated. In summing up the work done to date in his report to the city council it is shown that the transmission survey has been completed from Darrington to Snohomish, a distance of 42 miles. The railroad survey has been completed. Studies are now being carried on to determine the relative cost of construction and operation of a railroad and of the wagon road. Studies are also being made to determine the unit cost of the different parts of the work of constructing the power plant in order that the different methods of development may be readily compared. Topographic surveys of a power house site and of the river from the power house site to mile 21 on the trail—a distance of 5 miles—have been completed. Dimock says surveys of the river canyon and of the Ruby creek reservoir should be completed during the coming season. These surveys are necessary in order to complete the data required by the United States Government prior to issuing either preliminary or final permits.

THE PACIFIC CENTRAL DISTRICT

TULARE, CAL.—The Central California Gas Company will open an office and gas appliance store here.

ALAMEDA, CAL.—The Great Western Power Company is extending its lines into Alameda, to furnish power for the coaling station of the Rolph Shipping Company.

SAN FRANCISCO, CAL.—Tenders have been epened in Washington for an addition to the power plant of the Letterman General Hospital here. The cost is estimated at $60,000.

MERCED, CAL.—The people of Dos Palos voted in favor of forming a street lighting district. The supervisors will advertise for bids for the installation of ten 80 candle power street lights.

OROVILLE, CAL.—An additional 850 acres was added to the Honcut irrigation district, making a total of 24,000 acres of Butte county and Yuba county land that is to be irrigated by the proposed new system.

RED BLUFF, CAL.—The city trustees closed a lighting contract with the Northern California Power Company, in which it is agreed to furnish electricity for lighting the streets of the city for $200 per month for a period of one year.

SAN FRANCISCO, CAL.—The expenditure of $45,000 for the reconstruction of United Railroad tracks on Taraval street, between 20th and 23rd avenues, was authorized by the Board of Supervisors. Construction will be completed in forty days.

PETALUMA, CAL.—The United States Government has taken over the Marconi wireless station at Marshalls and in a few weeks it will be remodeled. With the new process installed it is said that the efficiency of the plant will be increased 40 per cent. Improvements are also to be made in the sending station at Bolinas.

SAN FRANCISCO, CAL.—Pacific Gas & Electric Company has announced the declaration of the regular quarterly dividend of $1.50 a share on the first preferred and the original preferred stock. This disbursement is payable on February 15, on stock of record January 31.

SAN FRANCISCO, CAL.—Condemnation proceedings for a big Hetch Hetchy reservoir site within the confines of the city will be started by the city within the next few days. This was decided upon at a meeting in the mayor's office several days ago and agreed to by the supervisors' public utilities committee at a special session in the city engineer's office.

MANTON, CAL.—The Northern California Power Company has purchased outright the water rights of Mary S. Allen in the Hackler ditch. The power company recently has purchased many large water rights in this section. It is believed that this indicates an enlargement of the generating capacity of the company's power plant near here.

WILLOWS, CAL.—Claiming that the West Side Canal Company could not guarantee a sufficient water supply for rice irrigation next year unless funds were provided for increasing the pumping plant capacity, the company officials asked rice growers of Glenn and Colusa counties to agree to an increase in water rate of approximately $4 an acre.

AMADOR CITY, CAL.—The Railroad Commission has issued an order allowing the Amador Electric Light and Power Company to increase its rates. The company showed that the cost of creating power and rendering service had increased materially owing to war conditions. It is estimated that the new rates will provide the company with an operating revenue of $39,472.

SAN FRANCISCO, CAL.—Dr. Washington Dodge has resigned as president of the Federal Telegraph Company and R. P. Schwerin was elected to the vacant chair. Simultaneously, E. W. Hopkins resigned as vice-president and the other directors resigned, their places being filled by Leon Bocqueraz of the French-American Bank of Savings, and T. C. Tognazzini of the Anglo California Trust Company.

SACRAMENTO, CAL.—Submission of a bond issue for $5,000,000 to the voters for the building of dams for flood water control is the nub of a bill introduced in the Assembly by Hurley of Oakland. He proposes that the state shall build reservoirs under the direction of the State Water Commission for the impounding and conservation of the water supply. He would utilize this water as needs be for irrigation and hydroelectric power.

STOCKTON, CAL.—Directors of the Modesto and Turlock Irrigation Districts have received a final report from Consulting Engineer A. J. Wiley of Idaho, and have his estimates and recommendations for the construction of the Don Pedro dam, reservoir and power plant in the upper Tuolumne river at a cost of $3,489,000. The Modesto and Turlock districts will build the project, standing for the cost at a third and two-thirds ratio.

WOODLAND, CAL.—Rice growers in Yolo county will loan the Yolo Water and Power Company the sum of $40,000 as financial assistance in completing its irrigation system this season. The company lost heavily in 1918. The United States Food Administration ordered the company to install a big pumping plant at Lower Lake with which to force water from Lake county upon rice lands in Yolo county. The two million dollar rice crop was saved, but the water company lost money.

SACRAMENTO, CAL.—Preliminary surveys for the Iron Canyon project, which has been given Federal assistance, will be under way in the Sacramento valley in the very near future, is the belief of W. A. Beard, secretary-manager of the Sacramento Valley Development Association, who announces that state funds to the extent of $5000 now are available. Another $10,000 from private sources also has been pledged in the Sacramento valley. Secretary of the Interior Franklin K. Lane some time ago gave Beard promise of $10,000 of Federal moneys if $12,000 were raised in California.

YUBA CITY, CAL.—The State Railroad Commission has authorized the Middle Yuba Hydro-Electric Company to increase its power rates to meet operating expenses and provide a reasonable return on its investment. The company is not permitted to change its lighting rates. It serves eleven mining companies in Allegheny and Forest and buys its energy from the Pacific Gas & Electric Company. Its plant the Commission values at $60,061. During the last fiscal

year, the compay says, it earned 1.27 per cent and in July, August and September of last year met a deficit of $937. The new rates are arranged to give the company a return of 7 per cent.

WILLOWS, CAL.—Contracts have been let during the past few days for ten large pumping outfits, consisting of wells, pumps and electric motors, all of which will be operated for water development purposes in connection with the rice industry. Hugh Garnett will have eight of these plants, two of which have already been installed, while the remainder have been contracted for. Three of these will be installed on his Germantown ranch and three more on the Garnett and Willard ranch southeast of this city. With these plants he hopes to irrigate his entire holdings. Several others of the large land owners are considering the development of underground supplies.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—The Board of Public Works has issued orders that the owners of the Mt. Washington Railway equip their line with new cables at once.

HOLBROOK, ARIZ.—A recent fire entirely destroyed the building occupied by L. Caldwell Company and the Navajo-Apache Telephone System, the damage amounting to $30,000.

EL CENTRO, CAL.—The Holton Power Company contemplates the expenditure of $35,000 or more on valley improvements this year, among them a second line from El Centro to Calexico.

LOS ANGELES, CAL.—New bids will be asked by the Board of Public Service for the penstock pipe to be used at Power Plant No. 2 in San Francisquito Canyon, previous bids being too high.

LOS ANGELES, CAL.—A proposal to buy the Pasadena electric system of the Southern California Edison Company for $510,108.32—if people will vote necessary bonds—has been formally made.

FLORENCE, ARIZ.—Burns & McDonnell, consulting engineers, Interstate building, Kansas City, Mo., are preparing plans for a new municipal waterworks system and lighting improvements for Florence, at an estimated cost of $80,000.

BRAWLEY, CAL.—The Southern Sierras Power Company will rebuild the lines from Bishop to Inyo, to raise the voltage from 55,000 to 87,000, at an expenditure of $300,000, according to Chief Engineer C. O. Poole. This will go through Brawley and Calexico.

SUPERIOR, ARIZ.—The Queen Creek Copper Company is figuring on the installation of a power plant which will include a 100 h.p. engine and a new compressor and hoist. Specifications are being prepared. W. E. Defty, consulting engineer and Mr. Stephen, president of the company, are at the plant looking over the situation.

TOMBSTONE, ARIZ.—Sealed bids will be received by the Board of Supervisors, f.o.b. Tombstone, for one complete electric light and power plant to furnish ample and sufficient power for 60-watt lamps to be used for lighting and furnishing power for the court house at Tombstone. The power plant must be in accordance with all necessary requirements of the board of underwriters.

LOS ANGELES, CAL.—Application has been made to the Board of Supervisors of Los Angeles county for a franchise granting a right to lay, maintain and operate for a period of 40 years, a system of pipe lines for the transportation of oil and gas along Mesa Drive, Hill Drive, San Gabriel Boulevard, Durfee Avenue, Lexington and Gallatin Road, and certain unnamed roads of E. J. Baldwin's second subdivision. Sealed bids will be received at the office of the Board of Supervisors up to March 3, 1919.

NEEDLES, ARIZ.—The Needles Gas and Electric Company has requested the Railroad Commission to order the Needles Ice Company to discontinue the sale of electric energy to the Murphy Water, Ice and Light Company, claiming that the ice company has installed a plant and strung wires to the Murphy plant and is about to operate as a public utility without having obtained the consent of the Railroad Commission, therefore in violation of the public utilities act.

THE INTER-MOUNTAIN DISTRICT

BRIGHAM CITY, UTAH.—The Brigham Natural Gas & Oil Company has been incorporated here for $500,000, by C. M. North, W. S. White, Charles Reeves and P. H. Ball.

OGDEN, UTAH.—The Oneida Irrigation District in Southern Idaho and the Amalgamated Sugar Company of Ogden are to complete the Oneida Canal at a cost of $400,000.

LOVELOCK, NEV.—The Woolsey Light & Power Company has sold to the Nevada Valley Power Company their electric system for the town of Lovelock. They will take over the business on the first of March.

PRESTON, IDA.—The trustees of Fairview, Idaho, have granted the Utah Power & Light Company a franchise until December 1, 1968, to construct and operate electric light and power lines for the purpose of supplying electricity to the village.

OGDEN, UTAH.—A communication from a Kansas City firm offering to furnish special plans and specifications for the proposed new municipal electric lighting plant was read before the city commissioners. The communication was referred to the city engineer for investigation into the merits of the proposition.

CALDWELL, IDA.—Among the business buildings that will be constructed in this city in the near future will be a large two-story brick as a depot building for the Caldwell Traction Company. Plans have been drawn by R. E. Field, local architect. The building will be 50 x 75 feet. R. W. Sebree is president of the traction company.

BOISE, IDA.—That the Utah Power & Light Company, through its predecessor, obtained use of the waters of Bear River and Bear Lake in Idaho under false pretenses by diverting the water to power uses instead of using it for irrigation purposes as agreed, is declared by the Idaho State Federation of Labor in a communication transmitted to the legislature of Idaho.

BOISE, IDA.—The keystone Dredging Company of San Francisco has purchased about 800 acres of placer ground on the Boise and Feather rivers near Featherville, including what has been known as the Old Junction Bar. The property is to be equipped at once with two of the largest dredges ever installed in the state. The total investment for the ground, dredges and power will be $800,000.

BOISE, IDA.—Changes in the administration of irrigation waters in Idaho are provided for in a bill framed at Twin Falls by delegates to the Idaho Irrigation Congress. The measure, which will be presented to the legislature, proposed the creation of a bureau of water rights, the members of which shall be appointive, and shall hold office for nine years at an annual salary of $7500. Continuity in the personnel of the board is especially desired.

PUEBLO, COL.—At the South Side water works at Pueblo, Colorado, during the year 1918 an electrically driven, direct connected pump of a capacity of 3,000,000 gallons daily was installed. The city is now preparing to install a second unit with 6,000,000 gallons daily capacity, and it is the intention of the trustees to electrify the entire pumping system during 1919. All of the energy is supplied by the Arkansas Valley Railway, Light & Power Company. The trustees estimate an annual saving of $10,000 when the plant is completely equipped for electrical operation.

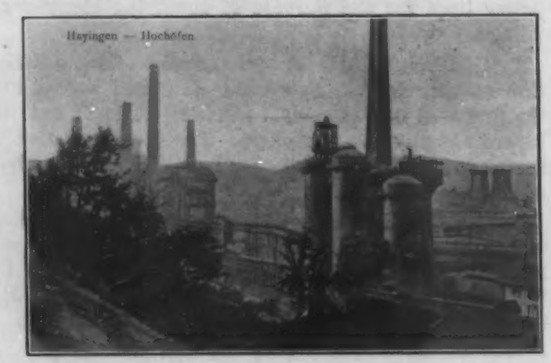
THE VACUUM CLEANER —— THE VACUUM CLEANER

THE VACUUM CLEANER —— THE VACUUM CLEANER —— THE VACUUM CLEANER

THE VACUUM CLEANER —— THE VACUUM CLEANER —— THE VACUUM CLEANER

SAVING THE WASTE has come to be the slogan of the hour and—with no disparagement of the material here presented—that is the object of these columns. Many a good thing on account of its diminutive size gets lost behind the couch—and it is only by emptying the contents of the Vacuum Cleaner's bag in public that its virtues are appreciated. Here are some of the collar buttons and twenty-dollar gold pieces that the Office janitor has accumulated.—The Editor.

To receive a postcard from Germany these days is like receiving a message from the departed. This, however, is a greeting from the newly arrived. P. H. Manchester, brother of Chester Manchester of the Economy Fuse Company, writes to the Journal of



Electricity from Hayingen, Germany, under date of Nov. 30, 1918. He says on the back of the card here shown:

I visited a large steel plant in this town today which had two steam turbines generating power for the plant, also lighting up this town. I noted American instruments (Weston) were on the switchboards. Most of the furnaces were also of American make. The electrical work in this country is more up to date than in France. P. H. MANCHESTER.

Why young men come West is explained in the following delightful poem which appeared recently in the "Spectator," Portland, Oregon. The West is willing to agree that most good things came out of the East, you see—but they accent the fact that they came out.

WHERE THE DREAMS COME TRUE

Men look to the East for the dawning things
For the light of the rising sun;
But they look to the West, the crimson West,
For the things that are done,—are done.
The Eastward sun is a new-made hope
From the dark of the night distilled,
But the Westward sun is the sunset sun—
The sign of a hope fulfilled.

For out of the East they have always come—
The cradles that saw the birth
Of all the heart-warm hopes of men,
Of all the hopes of earth.
For out of the East a Christ arose,
And out of the East there gleamed
The dearest dream and the clearest dream
That ever a prophet dreamed.

And into the waiting West they go,
With their dream child of the East,
And find the hopes they hoped of old
A thousand fold increased;
For there in the East we dreamed the dreams
Of the things we hoped to do;
But here in the West—the crimson West—
The dreams of the East come true.

DOUGLAS MALLOCK.

A new use for electric bulbs is suggested by the following quotation from "Now and Then," a little four-page publication gotten out occasionally for the benefit of members of the Business and Professional Women's Club of San Francisco. This issue is entitled "The Women's Friend" and is a take-off on some of the magazines which confine themselves to the more proverbial "woman's sphere." The following appears under Household Hints and is inserted in honor of Miss H. R. McDonald of the San Francisco office of the General Electric Company, who is a member of the club:

"Don't throw away your General Electric light bulbs after they are worn out. Keep them in a neat basket beside your bed for a burglar alarm. When thrown against the floor or wall they explode with a loud alarm equal to a six-shooter, and will scare away the most daring robber. They are also invaluable for discouraging prowling cats."

Banking difficulties in Manitoba are reported to affect the gas and electric industry. One of the men in Ontario from whom the Dominion Natural Gas Company leases some land, has moved to Manitoba and his rental checks have been sent there. Apparently banking facilities in Manitoba are radically different from those in Ontario, as the following letter will indicate:

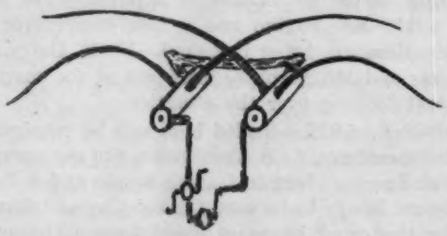
please gentlemen send me a postoffice for the time to come i have a hard job to get them checks cashed if you was to make them payable at any bank in canada they would be all right i do not no of a molston bank in manitoba and there is a dose of B.S. every time and 25c you do not no how sceart the banks is out hear and Oblige.

A trip to India usually does not pass unnoticed, but those who read the following item—last week—in the maritime section of the San Francisco Chronicle were in doubt as to whether they had overlooked an oriental trip of the editor. Mr. Sibley was recently in the East—but not the Far East, so far as the Vacuum Cleaner can learn. At any rate, he was absent but little more than two weeks. Further solution of the mystery is not available to date.

J. Frederick Gale, importer of New York and Calcutta, arrived as a passenger on the Pacific Mail liner Colusa from Calcutta and Singapore yesterday with a scar on the side of his head, and the other twenty-four passengers chuckled as they told how the injury was received. It seems that time hung heavily on the hands of the passengers as the ship was steaming through the tropics and Gale then hit upon a new game which he called "Soakem." He and the following passengers each provided themselves with a rolled up newspaper or magazine: Louis C. Morse, Robert Sibley and a few others from San Francisco. The game was for each to hit the other fellow with the paper as softly or as hard as each pleased. Gale was the recipient of a vicious accidental blow that laid the scalp open and then the game stopped.

ENGINEERS OF YESTERDAY—3. LEONARDO DA VINCI

(A Series Compiled by A. L. Jordan)



Is this a bird with four wings?

No, it is a reproduction of a sketch by Leonardo da Vinci (the famous Italian painter and sculptor), showing that plans for a heavier-than-air flying machine had been made in about 1600. He also discovered persistence of vision (a spark on the end of a stick revolved rapidly, giving the appearance of a circle), which is the beginning of the story of moving pictures; invented engines for offensive and defensive warfare, canal locks and other industrial appliances.

THE VACUUM CLEANER —— THE VACUUM CLEANER